DEPARTMENT OF THE INTERIOR
FRANKLIN K. LANE, Secretary

UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, Director

Water-Supply Paper 394

SURFACE WATER SUPPLY OF THE UNITED STATES

1914

PART XII. NORTH PACIFIC DRAINAGE BASINS

C. LOWER COLUMBIA RIVER AND PACIFIC DRAINAGE BASINS IN OREGON

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Prepared in cooperation with the States of
Oregon and Washington

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CONTENTS.

ILLUSTRATIONS.

SURFACE WATER SUPPLY OF LOWER COLUMBIA RIVER AND PACIFIC DRAINAGE BASINS IN OREGON, 1914.

AUTHORIZATION AND SCOPE OF WORK.

This volume is one of a series of fourteen reports presenting results of measurements of flow made on streams in the United States during the year ending September 30, 1914.

The data presented in these reports were collected by the United States Geological Survey under the following authority contained in the organic law (20 Stat. L., p. 394):

Provided, That this officer [th Director] shall have the direction of the Geological Survey and the classification of public lands and examination of the geological structure, mineral resources, and products of the national domain.

The work was begun in 1888 in connection with special studies relating to irrigation in the arid West. Since the fiscal year ending June 30, 1895, successive sundry bills passed by Congress have carried the following item and appropriations:

For gaging the streams and determining the water supply of the United States, and for the investigation of underground currents and artesian wells, and for the preparation of reports upon the best methods of utilizing the water resources.

Annual appropriations for the fiscal years ending June 30, 1895–1915.

1895	$12,500
1896	20,000
1897 to 1900, inclusive	50,000
1901 to 1902, inclusive	100,000
1903 to 1906, inclusive	200,000
1907	150,000
1908 to 1910, inclusive	100,000
1911 to 1915, inclusive	150,000

In the execution of the work many private and State organizations have cooperated, either by furnishing or by assisting in collecting data. Acknowledgments for cooperation of the first kind are made in connection with the description of each station affected; cooperation of the second kind is acknowledged on page 13.

Measurements of stream flow have been made at about 3,400 points in the United States and also at many points in Alaska and the Hawaiian Islands. In July, 1914, 1,480 gaging stations were being

maintained by the Survey and the cooperating organizations. Many miscellaneous discharge measurements are made at other points. In connection with this work data were also collected in regard to precipitation, evaporation, storage reservoirs, river profiles, and water power in many sections of the country and will be made available in water-supply papers from time to time.

DEFINITION OF TERMS.

The volume of water flowing in a stream—the "run-off" or "discharge"—is expressed in various terms, each of which has become associated with a certain class of work. These terms may be divided into two groups—(1) those that represent a rate of flow, as second-feet, gallons per minute, miner's inches, and discharge in second-feet per square mile, and (2) those that represent the actual quantity of water, as run-off in depth of inches, acre-feet, and millions of cubic feet. The principal terms used in this series of reports are second-feet, second-feet per square mile, run-off in inches, acre-feet, and millions of cubic feet. They may be defined as follows:

"Second-feet" is an abbreviation for "cubic feet per second." A second-foot is the rate of discharge of water flowing in a channel of rectangular cross section 1 foot wide and 1 foot deep at an average velocity of 1 foot per second. It is generally used as a fundamental unit from which others are computed by the use of the factors given in the tables of convenient equivalents (p. 9).

"Second-feet per square mile" is the average number of cubic feet of water flowing per second from each square mile of area drained, on the assumption that the run-off is distributed uniformly both as regards time and area.

"Run-off (depth in inches)" is the depth to which an area would be covered if all the water flowing from it in a given period were uniformly distributed on the surface. It is used for comparing run-off with rainfall, which is usually expressed in depth of inches.

An "acre-foot," equivalent to 43,560 cubic feet, is the quantity required to cover an acre to the depth of 1 foot. The term is commonly used in connection with storage for irrigation.

"Millions of cubic feet" is applied to quantities of water stored in reservoirs, most frequently in connection with studies of flood control.

The following terms not in common use are here defined:

"Discharge relation," an abbreviation for the term "relation of gage height to discharge."

"Control," "controlling section," and "point of control," terms used to designate the section or sections of the stream below the gage which determine the discharge relation at the gage. It should be noted that the control may not be the same section or sections at all stages.

The "point of zero flow" for a given gaging station is that point on the gage—the gage height—to which the surface of the river would fall if there were no flow.

CONVENIENT EQUIVALENTS.

The following is a list of convenient equivalents for use in hydraulic computations:

Table for converting discharge in second-feet per square mile into run-off in depth in inches over the area.

Discharge (second-feet per square mile)	Run-off (depth in inches).				
	1 day.	28 days.	29 days.	30 days.	31 days.
1	0.03719	1.041	1.079	1.116	1.153
2	.07438	2.083	2.157	2.231	2.306
3	.11157	3.124	3.236	3.347	3.459
4	.14876	4.165	4.314	4.463	4.612
5	.18595	5.207	5.393	5.578	5.764
6	.22314	6.248	6.471	6.694	6.917
7	.26033	7.289	7.550	7.810	8.070
8	.29752	8.331	8.628	8.926	9.223
9	.33471	9.372	9.707	10.041	10.376

NOTE.—For part of a month multiply the run-off for one day by the number of days.

Table for converting discharge in second-feet into run-off in acre-feet.

Discharge (second-feet).	Run-off (acre-feet).				
	1 day.	28 days.	29 days.	30 days.	31 days.
1	1.983	55.54	57.52	59.50	61.49
2	3.967	111.1	115.0	119.0	123.0
3	5.950	166.6	172.6	178.5	184.5
4	7.934	222.1	230.1	238.0	246.0
5	9.917	277.7	287.6	297.5	307.4
6	11.90	333.2	345.1	357.0	368.9
7	13.88	388.8	402.6	416.5	430.4
8	15.87	444.3	460.2	476.0	491.9
9	17.85	499.8	517.7	535.5	553.4

NOTE.—For part of a month multiply the run-off for one day by the number of days.

Table for converting discharge in second-feet into run-off in millions of cubic feet.

Discharge (second-feet).	Run-off (millions of cubic feet).				
	1 day.	28 days.	29 days.	30 days.	31 days.
1	0.0864	2.419	2.506	2.592	2.678
2	.1728	4.838	5.012	5.184	5.356
3	.2592	7.257	7.518	7.776	8.034
4	.3456	9.676	10.02	10.37	10.71
5	.4320	12.10	12.53	12.96	13.39
6	.5184	14.51	15.04	15.55	16.07
7	.6048	16.93	17.54	18.14	18.75
8	.6912	19.35	20.05	20.74	21.42
9	.7776	21.77	22.55	23.33	24.10

NOTE.—For part of a month multiply the run-off for one day by the number of days.

Table for converting discharge in second-feet into run-off in millions of gallons.

Discharge (second-feet).	Run-off (millions of gallons).				
	1 day.	28 days.	29 days.	30 days.	31 days.
1.....	0.6463	18.10	18.74	19.39	20.04
2.....	1.293	36.20	37.48	38.78	40.08
3.....	1.939	54.30	56.22	58.17	60.12
4.....	2.585	72.40	74.96	77.56	80.16
5.....	3.232	90.50	93.70	96.95	100.2
6.....	3.878	108.6	112.4	116.3	120.2
7.....	4.524	126.7	131.2	135.7	140.3
8.....	5.171	144.8	149.9	155.1	160.3
9.....	5.817	162.9	168.7	174.5	180.4

NOTE.—For part of a month multiply the run-off for one day by the number of days.

Table for converting velocity in feet per second into velocity in miles per hour.

[1 foot per second=0.681818 mile per hour, or two-thirds mile per hour, very nearly; 1 mile per hour=1.4666 feet per second. In computing the table the figures 0.68182 and 1.4667 were used.]

Feet per second (units).	Miles per hour for tenths of foot per second.									
	0	1	2	3	4	5	6	7	8	9
0.....	0.000	0.068	0.136	0.205	0.273	0.341	0.409	0.477	0.545	0.614
1.....	.682	.750	.818	.886	.995	1.02	1.09	1.16	1.23	1.30
2.....	1.36	1.43	1.50	1.57	1.64	1.70	1.77	1.84	1.91	1.98
3.....	2.05	2.11	2.18	2.25	2.32	2.39	2.45	2.52	2.59	2.66
4.....	2.73	2.80	2.86	2.93	3.00	3.07	3.14	3.20	3.27	3.34
5.....	3.41	3.48	3.55	3.61	3.68	3.75	3.82	3.89	3.95	4.02
6.....	4.09	4.16	4.23	4.30	4.36	4.43	4.50	4.57	4.64	4.70
7.....	4.77	4.84	4.91	4.98	5.05	5.11	5.18	5.25	5.32	5.39
8.....	5.45	5.52	5.59	5.66	5.73	5.80	5.86	5.93	6.00	6.07
9.....	6.14	6.20	6.27	6.34	6.41	6.48	6.55	6.61	6.68	6.75

1 second-foot equals 40 California miner's inches (law of Mar. 23, 1901).

1 second-foot equals 38.4 Colorado miner's inches.

1 second-foot equals 40 Arizona miner's inches.

1 second-foot equals 7.48 United States gallons per second; equals 448.8 gallons per minute; equals 646,317 gallons for one day.

1 second-foot for one year (365 days) covers 1 square mile 1.131 feet of 13.572 inches deep.

1 second-foot for one year (365 days) equals 31,536,000 cubic feet.

1 second-foot equals about 1 acre-inch per hour.

1 second-foot for one year (365 days) equals 724 acre-feet.

1 second-foot for one day equals 86,400 cubic feet.

1,000,000,000 (1 United States billion) cubic feet equals 11,570 second-feet for one day.

1,000,000,000 cubic feet equals 414 second-feet for one 28-day month.

1,000,000,000 cubic feet equals 399 second-feet for one 29-day month.

1,000,000,000 cubic feet equals 386 second-feet for one 30-day month.

1,000,000,000 cubic feet equals 373 second-feet for one 31-day month.

100 California miner's inches equals 18.7 United States gallons per second.

100 California miner's inches for one day equals 4.96 acre-feet.

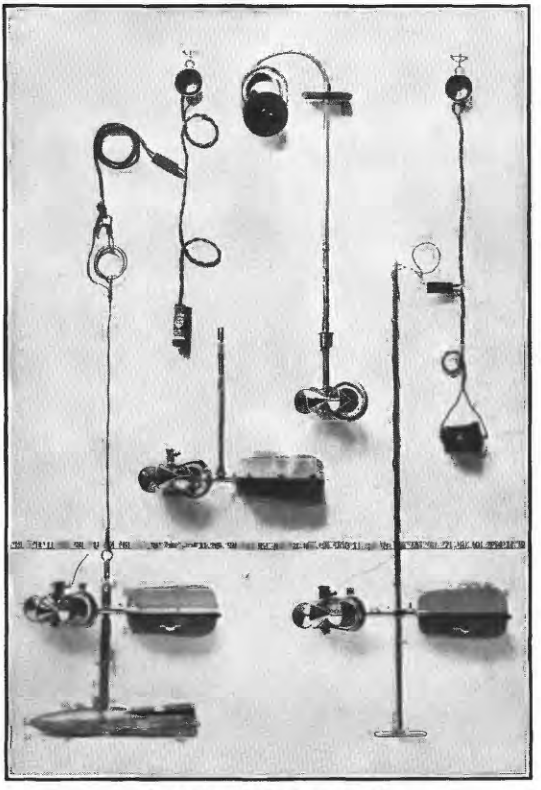
100 Colorado miner's inches equals 2.60 second-feet.

100 Colorado miner's inches equals 19.5 United States gallons per second.

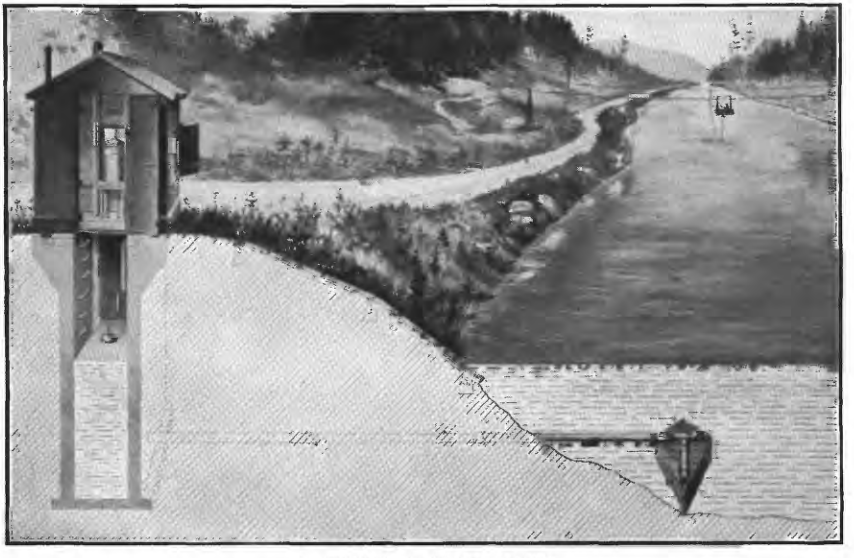
100 Colorado miner's inches for one day equals 5.17 acre-feet.

100 United States gallons per minute equals 0.223 second-foot.

100 United States gallons per minute for one day equals 0.442 acre-foot.



A. PRICE CURRENT METERS.



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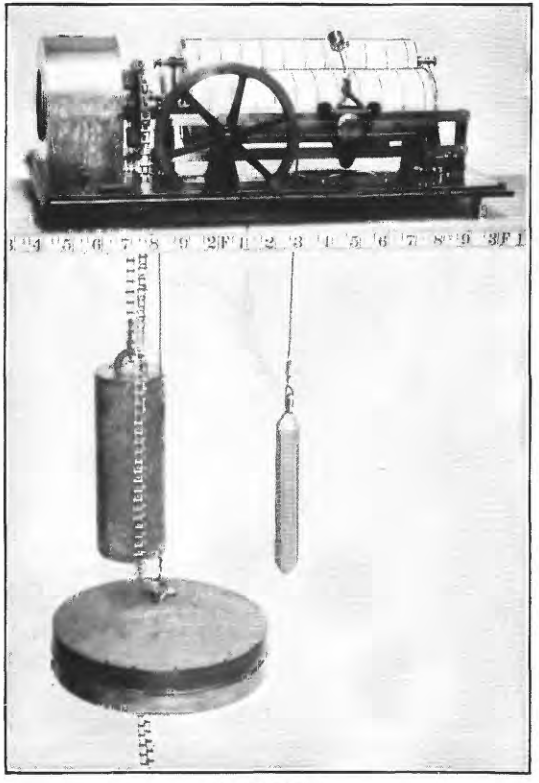

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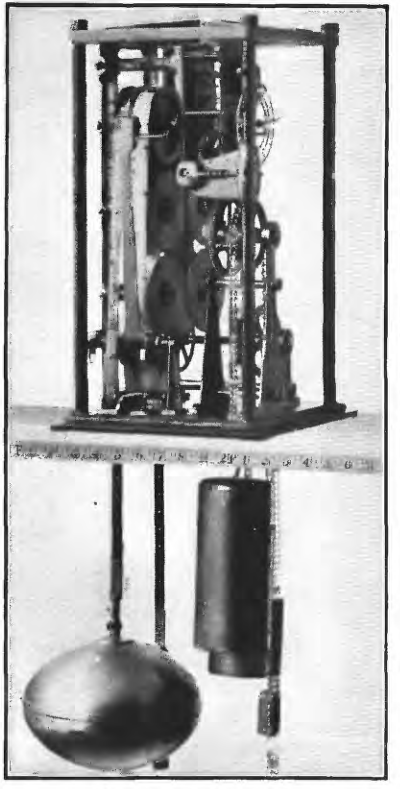
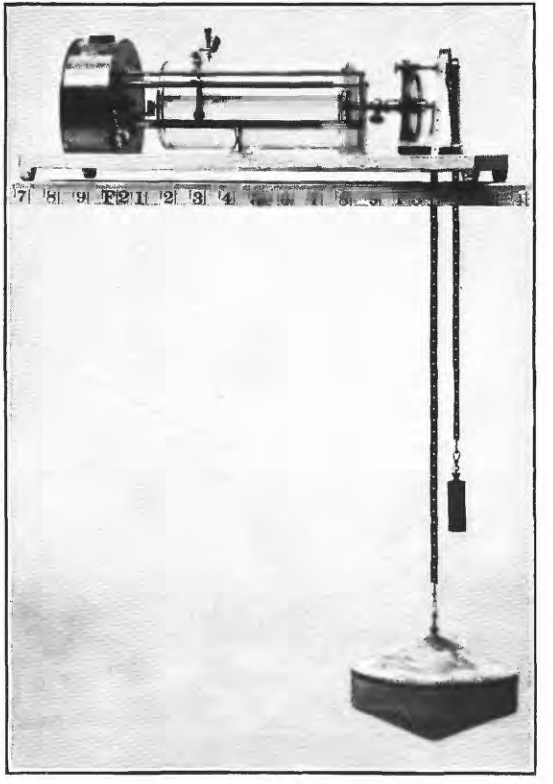


B. GURLEY PRINTING.



C. FRIEZ.

WATER-STAGE RECORDERS.

1,000,000 United States gallons per day equals 1.55 second-feet.
1,000,000 United States gallons equals 3.07 acre-feet.
1,000,000 cubic feet equals 22.95 acre-feet.
1 acre-foot equals 325,850 gallons.
1 inch deep on 1 square mile equals 2,323,200 cubic feet.
1 inch deep on 1 square mile equals 0.0737 second-foot per year.
1 foot equals 0.3048 meter.
1 mile equals 1.60935 kilometers.
1 mile equals 5,280 feet.
1 acre equals 0.4047 hectare.
1 acre equals 43,560 square feet.
1 acre equals 209 feet square, nearly.
1 square mile equals 2.59 square kilometers.
1 cubic foot equals 0.0283 cubic meter.
1 cubic foot of water weighs 62.5 pounds.
1 cubic meter per minute equals 0.5886 second-foot.
1 horsepower equals 550 foot-pounds per second.
1 horsepower equals 76.0 kilogram-meters per second.
1 horsepower equals 746 watts.
1 horsepower equals 1 second-foot falling 8.80 foot.
1⅛ horsepower equals about 1 kilowatt.

To calculate water power quickly: $\frac{\text{Second-feet} \times \text{fall in feet}}{11}$ = net horsepower on water wheel realizing 80 per cent of theoretical power.

EXPLANATION OF DATA.

The data presented in this report cover the year beginning October 1, 1913, and ending September 30, 1914. At the first of January in most parts of the United States much of the precipitation in the preceding three months is stored as ground water, in the form of snow or ice, or in ponds, lakes, and swamps, and this stored water passes off in the streams during the spring break-up; at the end of September, on the other hand, the only stored water available for run-off is possibly a small quantity in the ground; therefore the run-off for the year beginning October 1 is practically all derived from precipitation within that year.

The base data collected at gaging stations consist of records of stage, measurements of discharge, and general information used to supplement the gage heights and discharge measurements in determining the daily flow. The records of stage are obtained either from direct readings on a staff gage or from a water-stage recorder that gives a continuous record of the fluctuations. Measurements of discharge are made with a current meter by the general methods outlined in standard textbooks on the measurement of river discharge. (See Pls. I and II.)

From the discharge measurements rating tables are prepared that give the discharge for any stage, and these rating tables, when applied to the gage heights, give the daily discharge from which the monthly and yearly mean discharge is determined.

The data presented for each gaging station in the area covered by this report comprises a description of the station, a table giving results of discharge measurements, a table showing the daily discharge of the stream, and a table of monthly and yearly discharge and run-off.

If the base data are insufficient to determine the daily discharge, tables giving daily gage heights and results of discharge measurements are published.

The description of the station gives, in addition to statements regarding location and equipment, information in regard to any conditions that may affect the permanency of the discharge relation, covering such subjects as the occurrence of ice, the use of the stream for log driving, shifting of control, and the cause and effect of backwater; it gives also information as to diversions that decrease the flow at the gage, artificial regulation, maximum and minimum recorded stages, and the accuracy of the records.

The table of daily discharge gives the discharge in second-feet corresponding to the mean of the gage heights read each day. At stations on streams subject to sudden or rapid diurnal fluctuation the discharge obtained from the rating table and the mean daily gage height may not be the true mean discharge for the day. If such stations are equipped with water-stage recorders the true mean daily discharge may be obtained by weighting discharge for parts of the day.

In the table of monthly discharge the column headed "Maximum" gives the mean flow, for the day when the mean gage height was highest. As the gage height is the mean for the day, it does not indicate correctly the stage when the water surface was at crest height and the corresponding discharge was consequently larger than given in the maximum column. Likewise, in the column headed "Minimum" the quantity given is the mean flow for the day when the mean gage height was lowest. The column headed "Mean" is the average flow in cubic feet for each second during the month. On this average flow computations recorded in the remaining columns, which are defined on page 3, are based.

ACCURACY OF FIELD DATA AND COMPUTED RESULTS.

The accuracy of stream-flow data depends primarily (1) on the permanency of the discharge relation and (2) on the accuracy of observation of stage, measurements of flow, and interpretation of records.

Footnotes added to the daily discharge tables give information regarding the probable accuracy of the rating tables used, and an accuracy column is inserted in the monthly discharge table. For the rating tables, "well defined" indicates, in general, that the rating is probably accurate within 5 per cent; "fairly well defined,"

within 10 per cent; "poorly defined" or "approximate," within 15 to 25 per cent. These notes are very general and are based on the plotting of the individual measurements with reference to the mean rating curve.

The letter in the column headed "Accuracy," in the monthly discharge table, rates the accuracy of the monthly mean and not that of the estimate of maximum or minimum discharge or the discharge for any one day. The rating is determined by considering the accuracy of the rating curve, the probable reliability of the observer, the number of gage readings per day, the range of the fluctuation in stage, and local conditions. In this column A indicates that the mean monthly flow is probably accurate within 5 per cent; B, within 10 per cent; C, within 15 per cent; D, within 25 per cent. Special conditions are covered by footnotes.

The monthly means for any station may represent with high accuracy the quantity of water flowing past the gage, but the figures showing discharge per square mile and depth of run-off in inches may be subject to gross errors caused by the inclusion of large noncontributing districts in the measured drainage area, by lack of informatiom concerning water diverted for irrigation or other use, or by inability to interpret the effect of artificial regulation of the flow of the river above the station. "Second-feet per square mile" and "run-off (depth in inches)" are therefore not computed if such errors appear probable. The computations are also omitted for stations on streams draining areas in which the annual rainfall is less than 20 inches. All figures representing "second-feet per square mile" and "run-off (depth in inches)" previously published by the Survey should be used with caution because of possible inherent sources of error not known to the Survey.

The table of monthly discharge gives only a general idea of the flow at the station and should not be used for other than preliminary estimates; the tables of daily discharge allow more detailed studies of the variation in flow. It should be borne in mind, however, that the observations in each succeeding year may be expected to throw new light on data previously published.

COOPERATION.

During the year ending September 30, 1914, the work in Oregon and Washington has been done under cooperative agreements between the United States Geological Survey and the respective States.

Cooperation with the States is effected under contracts which are made between the Director of the Federal Survey and the State engineers or other officials and are authorized by legislative acts

appropriating moneys. The State contracts are essentially of the same order, the principal provisions being substantially as follows:

1. The United States Geological Survey retains direct supervision of the field work and the preparation of the data for publication.

2. The Federal Survey retains possession of all material collected—field notes, maps, etc.—but this material is open at all times to inspection by the State officials, and if not satisfactory the agreements can be terminated at any time.

3. The salaries of gage observers and the salaries and traveling and field expenses of the engineers are divided between the two parties in some manner agreed upon, the accounts being rendered monthly in accordance with the regulations of the Federal Survey.

4. The streams and localities in which investigations shall be made are determined by conference between the State officials and the representatives of the United States Geological Survey.

5. The cost of publication is borne entirely by the Federal Survey.

In general, the cooperative agreements specify that the United States Geological Survey shall allot from its appropriation a sum equal to that appropriated from State funds.

Special acknowledgments are due to John H. Lewis, State engineer of Oregon, and to Henry Landes, State geologist of Washington, for the very efficient manner in which they represented their States in the cooperative investigations.

Acknowledgments are also due to the engineers and employees of the United States Reclamation Service, the United States Forest Service, and of the United States Office of Indian Affairs for assistance, suggestions, and the freest use of data gathered exclusively for them and for which they have paid. Acknowledgments are also due to the Corps of Engineers, United States Army, and the officers of the United States Weather Bureau for hydrographic and climatologic data.

Special acknowledgments are due for financial assistance rendered by municipalities, corporations, and individuals, as follows: Water Bureau of the City of Portland, Pacific Power & Light Co., Northwestern Electric Co., Portland Railway Light & Power Co., California-Oregon Power Co., Hydroelectric Co., Waldo Lake Irrigation & Power Co., Central Oregon Irrigation Co., Arnold Irrigation Co., Teel Irrigation Co., East Fork Irrigation District, Eastern Oregon Land Co., Morsen Land Co., Bay City Land Co., C. A. Stanburrough, J. M. Griffin, Malcolm A. Moody, C. T. Hubbard, H. G. Hayes, and J. G. Kelley.

DIVISION OF WORK.

The data for stations in Oregon and Washington, with the exception of those noted below, were collected and prepared for publication under the direction of F. F. Henshaw, district engineer, assisted by

James E. Stewart, C. L. Batchelder, R. R. Randell, P. V. Hodges, and H. J. Dean, junior engineers.

For stations in Walla Walla River and Cowlitz River basins in Washington the data were collected and prepared for publication under the direction of G. L. Parker, district engineer, assisted by A. H. Tuttle and C. O. Brown, assistant engineers, F. B. Storey, J. T. Hartson, I. L. Collier, and L. W. Jordan, junior engineers.

The records were reviewed and assembled by James E. Stewart, junior engineer.

GAGING-STATION RECORDS.

LOWER COLUMBIA RIVER AND TRIBUTARIES.

COLUMBIA RIVER AT THE DALLES, OREG.

LOCATION.—In sec. 34, T. 2 N., R. 13 E., 2,000 feet below the ferry at The Dalles, about 18 miles below Deschutes River, and above Hood and Klickitat rivers.

DRAINAGE AREA.—237,000 square miles.

RECORDS AVAILABLE.—June 1, 1878, to September 30, 1914. Maximum stages 1858–1877.

GAGE.—Two gages at The Dalles: The Government or Brooks gage, used by the United States Geological Survey, made up of several sections attached to the piling of the viaduct connecting Regulator Dock with the warehouse; the United States Army Engineers' gage, similar in form but with a datum 8.9 feet lower than the Brooks gage. Gage at Cascade Locks, 20 miles below The Dalles, which was used in working up early records, has been situated at various points but is at present attached to the side of wooden fender of upper locks chamber between upper guard and lock gates. Elevation of datum of Brooks gage, 46.36 feet. (1912 adjustment of primary level net.)

DISCHARGE MEASUREMENTS.—In 1903 made by United States engineers with rod floats and meter from a steamer; in 1907 by United States Geological Survey engineers with meter from a launch; in 1908 flood measurements by United States Geological Survey engineers 2,000 feet below gage at The Dalles; in 1910 and 1913 measurements by United States Survey engineers on Columbia River above Snake River and on Snake River referred to The Dalles gage, allowance being made for intervening tributaries.

CHANNEL AND CONTROL.—Rocky and permanent at the rapids at Cascade Locks, the control for all three gages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 29.6 feet at 8 a. m. May 27 (discharge, 493,000 second-feet); minimum stage recorded, 1.0 feet at 8 a. m. January 1 and 2 (discharge, 70,600 second-feet).

COOPERATION.—Gage readings furnished by the United States Weather Bureau.

The following discharge measurement was made by F. B. Storey: The Columbia was measured at Pasco, Wash., and the discharge of Snake, Umatilla, John Day, and Deschutes rivers added to give the flow at The Dalles.

November 21, 1913: Gage height, 4.30 feet; discharge, 101,000 second-feet.

Daily discharge, in second-feet, of Columbia River at The Dalles, Oreg., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	116,000	103,000	103,000	71,400	107,000	131,000	140,000	263,000	441,000	367,000	226,000	125,000
2	114,000	104,000	100,000	70,600	103,000	13,5000	136,000	261,000	439,000	367,000	218,000	125,000
3	117,000	101,000	98,000	70,600	98,000	135,000	136,000	260,000	439,000	354,000	212,000	125,000
4	120,000	102,000	97,000	72,200	98,000	135,000	134,000	267,000	445,000	344,000	206,000	122,000
5	117,000	101,000	96,000	80,200	89,200	135,000	136,000	279,000	459,000	342,000	199,000	121,000
6	112,000	106,000	92,000	91,000	87,400	132,000	140,000	299,000	461,000	340,000	197,000	117,000
7	112,000	102,000	92,000	94,000	86,500	132,000	146,000	307,000	457,000	339,000	194,000	115,000
8	112,000	99,000	89,200	101,000	83,800	134,000	164,000	307,000	447,000	342,000	192,000	113,000
9	112,000	101,000	86,500	106,000	78,600	134,000	177,000	302,000	435,000	342,000	188,000	112,000
10	110,000	103,000	85,600	105,000	78,600	135,000	188,000	305,000	428,000	344,000	184,000	110,000
11	112,000	104,000	85,600	102,000	79,400	138,000	197,000	320,000	424,000	344,000	184,000	110,000
12	113,000	103,000	83,800	101,000	78,600	142,000	202,000	328,000	420,000	340,000	181,000	110,000
13	114,000	101,000	82,900	99,000	78,600	143,000	206,000	340,000	412,000	337,000	176,000	108,000
14	113,000	101,000	82,000	96,000	78,600	143,000	212,000	349,000	407,000	334,000	176,000	106,000
15	114,000	103,000	82,000	92,000	78,600	144,000	220,000	354,000	407,000	330,000	168,000	105,000
16	114,000	103,000	81,100	92,000	78,600	147,000	233,000	367,000	418,000	327,000	165,000	105,000
17	113,000	100,000	81,100	90,100	79,400	148,000	243,000	385,000	418,000	324,000	161,000	104,000
18	113,000	99,000	82,000	90,100	78,600	155,000	264,000	407,000	424,000	321,000	155,000	105,000
19	107,000	99,000	80,200	90,100	77,800	159,000	267,000	430,000	430,000	318,000	151,000	105,000
20	106,000	99,000	77,000	89,200	78,600	165,000	270,000	433,000	430,000	316,000	150,000	106,000
21	107,000	100,000	74,600	89,200	79,400	170,000	264,000	433,000	430,000	313,000	150,000	107,000
22	106,000	99,000	75,400	100,000	82,900	174,000	269,000	433,000	430,000	303,000	146,000	106,000
23	107,000	99,000	75,400	108,000	87,400	178,000	273,000	437,000	426,000	299,000	142,000	105,000
24	106,000	101,000	75,400	102,000	93,000	177,000	273,000	449,000	422,000	292,000	138,000	103,000
25	104,000	101,000	72,200	102,000	107,000	174,000	275,000	471,000	411,000	286,000	136,000	103,000
26	104,000	98,000	72,200	108,000	115,000	169,000	276,000	487,000	397,000	275,000	136,000	101,000
27	107,000	98,000	72,200	110,000	123,000	164,000	275,000	493,000	388,000	267,000	136,000	100,000
28	105,000	98,000	72,200	111,000	131,000	159,000	272,000	487,000	381,000	260,000	136,000	100,000
29	105,000	98,000	71,400	108,000	.....	155,000	270,000	471,000	377,000	251,000	132,000	99,000
30	103,000	102,000	71,400	110,000	.....	150,000	269,000	457,000	374,000	243,000	131,000	98,000
31	102,000	.....	72,200	104,000	.....	143,000	.....	445,000	.....	234,000	130,000	.....

NOTE.—Discharge determined from a well-defined rating curve. Discharge interpolated (gage broken off) July 16–18.

Monthly discharge of Columbia River at The Dalles, Oreg., for the year ending Sept. 30, 1914.

[Drainage area, 237,000 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
October	120,000	102,000	110,000	0.464	0.53	6,760,000	A.
November	105,000	98,000	101,000	.426	.48	6,010,000	A.
December	103,000	71,400	82,600	.348	.40	5,080,000	A.
January	111,000	70,600	95,300	.402	.46	5,860,000	A.
February	131,000	77,800	89,800	.379	.39	4,990,000	A.
March	178,000	131,000	150,000	.633	.73	9,220,000	A.
April	276,000	134,000	218,000	.920	1.03	13,000,000	A.
May	493,000	260,000	375,000	1.58	1.82	23,100,000	A.
June	461,000	374,000	423,000	1.78	1.99	25,200,000	A.
July	367,000	234,000	316,000	1.33	1.53	19,400,000	A.
August	226,000	130,000	168,000	.709	.82	10,300,000	A.
September	125,000	98,000	109,000	.460	.51	6,490,000	A.
The year	493,000	70,600	187,000	.789	10.70	135,000,000	

SOUTH FORK OF WALLA WALLA RIVER NEAR MILTON, OREG.

LOCATION.—In SE. ¼ sec. 9, T. 4 N., R. 37 E., one-fourth mile above headgate of pipe line of Pacific Power & Light Co., about 12 miles above Milton. Above all diversions.

DRAINAGE AREA.—72 square miles.

RECORDS AVAILABLE.—August 10 to September 15, 1906; January 1, 1907, to March 14, 1908; October 14, 1908, to September 30, 1914. At point 6 miles below present site, February 16, 1903, to May 29, 1906.

GAGE.—Vertical staff.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Gravel and small boulders; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.60 feet at 3 p. m. April 15 (discharge, 390 second-feet); minimum stage recorded, 2.55 feet, August 21 to September 6 (discharge, 99 second-feet).

WINTER FLOW.—Discharge relation not affected by ice.

ACCURACY.—Records excellent.

No discharge measurements made during the year ending September 30, 1914.

Daily discharge, in second-feet, of South Fork of Walla Walla River near Milton, Oreg., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	107	126	143	122	130	270	165	224	158	109	104	99
2	107	122	136	126	126	270	173	254	158	107	104	99
3	107	116	126	143	126	224	193	254	156	107	104	99
4	111	116	126	186	126	210	224	254	147	109	104	99
5	111	124	122	224	122	196	302	224	147	107	104	99
6	111	149	122	210	116	196	286	254	147	107	104	99
7	165	136	122	186	116	224	270	224	152	107	104	104
8	122	126	116	170	122	254	254	254	147	107	104	104
9	134	126	116	158	116	254	254	254	143	107	104	105
10	122	126	116	147	122	239	270	254	136	107	104	104
11	143	130	116	143	128	210	254	239	136	107	104	104
12	136	126	116	136	145	210	224	239	143	107	104	107
13	147	122	116	130	143	210	286	254	143	107	104	105
14	136	122	116	134	143	210	286	254	136	107	104	132
15	126	116	116	130	143	224	371	254	130	107	104	128
16	126	126	111	126	143	318	318	254	128	107	104	122
17	122	126	111	126	143	286	286	254	126	105	104	134
18	122	130	116	126	143	286	270	224	126	104	104	124
19	122	126	116	126	143	286	286	224	122	104	104	122
20	122	130	107	126	168	254	286	210	122	104	104	116
21	122	126	107	130	254	224	270	210	122	104	99	109
22	122	130	116	196	270	224	254	210	122	104	99	107
23	122	130	116	210	224	224	254	224	122	104	99	107
24	152	136	111	202	210	210	239	210	124	104	99	107
25	175	136	116	191	302	196	224	196	122	104	99	107
26	147	130	116	191	254	191	224	191	122	104	99	107
27	143	175	107	170	254	183	224	186	116	104	99	107
28	136	170	107	170	239	175	210	170	116	104	99	107
29	126	165	107	156	.....	170	196	165	115	104	99	107
30	126	152	107	145	.....	165	210	158	111	104	99	107
31	126	.....	126	136	.....	165	.....	158	.....	104	99	.....

NOTE.—Discharge determined from a rating curve well defined between 90 and 360 second-feet.

Monthly discharge of South Fork of Walla Walla River near Milton, Oreg., for the year ending Sept. 30, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	175	107	129	9307	A.
November	175	116	132	7,860	A.
December	143	107	117	7,190	A.
January	224	122	157	9,650	A.
February	302	116	167	9,280	A.
March	318	165	224	13,800	A.
April	371	165	252	15,000	A.
May	254	158	224	13,800	A.
June	158	111	133	7,910	A.
July	109	104	106	6,520	A.
August	104	99	102	6,270	A.
September	134	99	109	6,490	A.
The year	371	99	154	112,000	

MILL CREEK NEAR WALLA WALLA, WASH.

LOCATION.—In sec. 12, T. 6 N., R. 37 E. Willamette meridian, below the diversion dam of the Walla Walla water-supply system and 12 miles east of Walla Walla, in Walla Walla County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 27, 1913, to September 30, 1914.

GAGE.—Since October 22, 1913, vertical staff on left bank, reading from 0.5 to 7.0 feet, spiked to roots and overhanging limbs of a cottonwood tree 500 feet below the diversion dam of the Walla Walla water-supply system. A temporary gage at the same site and datum was read prior to October 22, 1913. Gage read to nearest quarter-tenth of a foot twice a day by Otto Zimmerman, head-works attendant for the Walla Walla waterworks.

DISCHARGE MEASUREMENTS.—Made from footbridge 50 feet above gage or by wading.

CHANNEL AND CONTROL.—Banks high and will not overflow. Control consists of a long gravel and boulder riffle, which is fairly permanent, extending above and below gage. Zero flow would occur at approximately zero of gage.

EXTREMES OF DISCHARGE.—1913–14: Maximum stage recorded, 2.6 feet at 3 p. m. February 27, 1914 (discharge 443 second-feet); minimum stage recorded, 0.80 foot August 27–September 21, September 23–28, and October 1–3, 1913 (discharge, 29 second-feet).

WINTER FLOW.—Discharge relation not seriously affected by ice; open-channel rating curve assumed applicable except for February 6, when discharge was interpolated.

DIVERSIONS.—The city of Walla Walla diverts 22 to 28 second-feet past the gage for public water supply.

REGULATION.—Gates at intake of water-supply conduit are closed at infrequent intervals for cleaning settling basin.

ACCURACY.—Gage-height record considered reliable. Rating curve well defined above and fair below 75 second-feet.

Discharge measurements of Mill Creek near Walla Walla, Wash., during the period Aug. 27, 1913, to Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1913.		*Feet.*	*Sec.-ft.*	1914.		*Feet.*	*Sec.-ft.*
Aug. 27	F. B. Storey	0.81	30.3	Feb. 3	L. W. Jordan	1.17	[b] 68.4
Oct. 22	do	.92	[a] 36.8	May 23	G. L. Parker	1.28	[c] 73.4
				25	do	1.26	71.4

[a] 28.5 second-feet diverted above the gage for water supply of Walla Walla.
[b] 26.3 second-feet diverted above the gage for water supply of Walla Walla.
[c] 21.6 second-feet diverted above the gage for water supply of Walla Walla.

Daily discharge, in second-feet, of Mill Creek near Walla Walla, Wash., for the period Aug. 27, 1913, to Sept. 30, 1914.

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	29	29	42	73	49	73	405	83	83	60	38	32	32
2	.....	29	29	40	60	58	67	334	83	88	60	37	32	32
3	.....	29	29	38	56	82	64	252	98	96	59	36	32	32
4	.....	29	32	38	54	207	66	236	114	94	54	38	32	32
5	.....	29	30	38	52	300	61	236	180	88	73	39	32	32
6	.....	29	35	46	46	267	56	222	156	88	64	38	32	32
7	.....	29	105	44	46	180	52	207	145	83	56	38	32	35
8	.....	29	40	44	44	134	52	236	134	90	59	36	33	33
9	.....	29	60	44	44	114	50	252	134	90	60	36	33	33
10	.....	29	44	44	42	90	54	207	124	86	55	36	33	32
11	.....	29	44	46	42	74	54	180	114	83	52	36	33	36
12	.....	29	42	46	40	69	72	156	124	83	49	36	33	36
13	.....	29	49	44	40	66	79	156	134	86	49	36	33	33
14	.....	29	44	42	40	65	83	156	145	103	60	36	33	46
15	.....	29	44	40	40	65	88	180	207	96	50	36	33	60
16	.....	29	42	40	38	60	88	222	236	88	46	36	33	44
17	.....	29	40	42	38	60	88	222	207	83	46	35	33	45
18	.....	29	40	44	38	60	83	207	168	83	44	35	33	44
19	.....	29	40	44	38	54	82	180	168	77	44	35	33	41
20	.....	29	38	64	38	52	96	168	156	73	44	35	33	39
21	.....	29	38	60	38	61	267	156	145	72	44	35	33	36
22	.....	30	38	56	38	207	334	145	134	69	44	35	33	36
23	.....	29	38	124	38	252	267	134	134	77	44	35	33	35
24	.....	29	124	114	36	207	267	124	114	69	46	35	33	35
25	.....	29	66	110	36	156	352	114	107	73	45	35	33	35
26	.....	29	60	105	36	194	284	105	105	69	42	35	32	35
27	29	29	60	156	36	156	369	94	103	73	41	35	32	35
28	29	29	49	145	36	110	387	90	94	65	40	32	32	32
29	29	36	44	134	36	100	.....	88	88	64	40	32	32	32
30	29	30	42	105	36	80	.....	86	83	60	40	32	32	32
31	29	.....	42	.....	66	79	.....	83	.....	60	.....	32	32	.....

NOTE.—Discharge determined from a rating curve fairly well defined between 23 and 360 second-feet Discharge relation probably affected by ice; discharge interpolated Feb. 6.

Monthly discharge of Mill Creek near Walla Walla, Wash., for 1913–14.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
1913.					
August 27–31	29	29	29.0	288	B.
September	36	29	29.3	1,740	B.
The period	.....	.....	.....	2,000	.....
1914.					
October	124	29	47.0	2,890	B.
November	156	38	66.0	3,930	B.
December	73	36	43.3	2,660	B.
January	300	49	120.0	7,380	A.
February	387	50	141.0	7,830	A.
March	405	83	182.0	11,200	A.
April	236	83	134.0	7,970	A.
May	103	60	80.4	4,940	A.
June	73	40	50.3	2,990	B.
July	39	32	35.5	2,180	B.
August	33	32	32.6	2,000	B.
September	60	32	36.4	2,170	B.
The year	405	29	80.2	58,100	

UMATILLA RIVER AT YOAKUM, OREG.

LOCATION.—In the SW. ¼ sec. 2, T. 2 N., R. 30 E., at the Yoakum wagon bridge, 18 miles below Pendleton and half a mile east of the Yoakum station of the Oregon-Washington Railroad & Navigation Co.

DRAINAGE AREA.—1,200 square miles.

RECORDS AVAILABLE.—May 5, 1903, to September 30, 1914.

GAGE.—Vertical staff spiked to right abutment of highway bridge.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading.

CHANNEL AND CONTROL.—Rock and gravel; shifts in extreme floods. One channel at all stages. Left bank overflows during extreme floods. Control composed of lava boulders.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.62 feet at 5.30 p. m., March 1 (discharge, 3,820 second-feet); minimum stage recorded, 2.60 feet August 10 to September 7 (discharge, 16 second-feet).

WINTER FLOW.—River occasionally freezes for short periods.

ARTIFICIAL CONTROL.—Summer flow affected by diversions for irrigation and by the release of stored water from the Furnish reservoir, 5 miles upstream.

ACCURACY.—Results good.

Discharge measurements of Umatilla River at Yoakum, Oreg., during the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec 29	F. F. Henshaw	3.56	171	Apr. 27	P. V. Hodges	4.95	847
29	do	3.55	167				

Daily discharge, in second-feet, of Umatilla River at Yoakum, Oreg., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	59	211	277	202	580	3,640	670	610	298	122	24	16
2	59	185	281	239	550	3,640	670	610	318	112	24	16
3	59	179	314	302	492	2,920	820	640	277	110	24	16
4	59	179	363	465	438	2,420	1,100	670	235	110	24	16
5	76	179	363	1,220	438	2,420	2,300	610	235	102	24	16
6	115	179	340	2,300	363	2,300	2,420	550	235	100	24	16
7	146	260	340	1,750	386	2,660	1,960	520	235	102	24	16
8	178	256	318	1,450	386	3,200	1,750	465	235	94	28	31
9	168	263	270	1,360	386	3,340	1,550	580	235	90	32	43
10	175	260	242	1,030	363	2,920	1,550	492	235	90	16	35
11	208	260	235	855	492	2,420	1,550	410	228	90	16	33
12	221	260	235	730	700	2,300	1,450	410	225	90	16	31
13	214	225	235	640	790	2,070	1,450	386	208	102	16	28
14	214	225	225	580	890	1,960	1,450	410	194	106	16	24
15	203	235	211	520	890	2,070	1,750	386	174	100	16	39
16	192	235	208	520	820	2,420	2,660	386	142	100	16	64
17	180	235	208	465	820	2,920	2,420	386	135	100	16	82
18	175	235	202	438	760	2,790	1,960	363	126	94	16	76
19	168	235	202	438	730	2,660	1,650	363	112	90	16	68
20	157	242	179	410	820	2,420	1,750	318	110	90	16	68
21	157	293	179	410	1,220	2,070	1,550	318	114	92	16	68
22	157	340	174	492	2,420	1,960	1,360	318	100	75	16	68
23	157	386	174	960	2,070	1,850	1,180	363	106	75	16	68
24	157	465	174	1,140	2,660	7,650	1,060	363	110	74	16	60
25	175	520	176	1,360	3,490	1,450	925	363	118	72	16	60
26	260	520	174	1,270	3,200	1,220	855	363	130	63	16	60
27	256	520	166	1,220	2,540	1,000	855	363	122	48	16	68
28	242	340	166	960	3,340	890	790	363	120	45	16	60
29	242	340	166	790	.....	790	700	318	126	45	16	63
30	242	302	166	700	.....	730	610	314	126	38	16	76
31	235	.....	176	640	.....	700	.....	298	.....	32	16	.....

NOTE.—Discharge determined from two rating curves applicable as follows: Oct. 1–25, fairly well defined; Oct. 26 to Sept. 30, well defined.

Monthly discharge of Umatilla River at Yoakum, Oreg., for the year ending Sept. 30, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	260	59	259	15,900	B.
November	520	179	285	17,000	B.
December	363	166	230	14,100	A.
January	2,300	202	834	51,300	A.
February	3,490	363	1,180	65,500	A.
March	3,640	700	2,190	135,000	A.
April	2,660	610	1,430	85,100	A.
May	670	298	429	26,400	A.
June	318	100	179	10,700	A.
July	122	32	85.6	5,260	A.
August	32	16	18.7	1,150	B.
September	82	16	46.7	2,780	B.
The year	3,640	16	593	430,000	

UMATILLA RIVER NEAR UMATILLA, OREG.

LOCATION.—In the NW. ¼ sec. 21, T. 5 N., R. 28 E., 1½ miles above Umatilla and the mouth of the river, near main-line track of Oregon-Washington Railroad & Navigation Co. and about a mile below diversion point of Oregon Land & Water Co.'s canal.

DRAINAGE AREA.—2,130 square miles.

RECORDS AVAILABLE.—October 21, 1903, to September 30, 1914. Records show total unappropriated flow of river.

GAGE.—Inclined staff in two sections; lower section 1.2 to 3.5 feet, upper 3.5 to 10.8 feet.

DISCHARGE MEASUREMENTS.—Made from cable.

CHANNEL AND CONTROL.—Solid rock without gravel or sand. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.1 feet March 2 (discharge, 3,140 second-feet); minimum stage recorded, 2.50 feet August 9 to September 14 (discharge, 90 second-feet).

WINTER FLOW.—Shore or floating ice forms occasionally; discharge relation not materially affected by ice.

DIVERSIONS.—Large part of total flow of river diverted for irrigation above station. The Umatilla project feed canal also diverts water during the winter for storage in the Cold Springs reservior. The low-water flow is return water from the Hermiston project and other irrigated tracts.

ACCURACY.—Results excellent.

COOPERATION.—Field data furnished by United States Reclamation Service; records computed by United States Geological Survey.

No discharge measurements made during the year.

Daily discharge, in second-feet, of Umatilla River near Umatilla, Oreg., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	120	305	160	124	495	2,960	415	340	160	120	96	90
2	128	270	160	160	455	3,140	415	340	152	120	96	90
3	140	258	160	185	415	2,620	415	340	144	120	96	90
4	140	234	185	270	415	2,130	580	340	140	120	96	90
5	140	210	200	880	378	1,970	770	305	140	120	96	90
6	140	200	210	1,520	378	1,970	1,520	270	140	120	96	90
7	148	185	210	1,660	340	1,970	1,660	240	128	120	93	90
8	160	160	210	1,520	340	2,130	1,240	210	120	120	93	90
9	160	160	195	1,240	340	2,450	1,120	210	120	120	90	90
10	210	160	185	995	305	2,290	995	185	140	120	90	90
11	210	160	160	770	270	2,130	1,240	160	140	120	90	90
12	210	160	160	770	240	1,520	995	160	140	120	90	90
13	210	160	160	720	210	1,240	880	160	140	120	90	90
14	222	160	156	670	210	1,520	880	160	140	114	90	90
15	234	160	156	625	210	1,660	880	152	140	105	90	96
16	234	160	148	580	270	1,660	1,660	140	132	105	90	108
17	240	160	144	495	340	1,970	1,820	128	120	105	90	120
18	240	185	140	495	495	2,130	1,520	120	120	105	90	128
19	240	210	132	770	770	2,130	1,240	120	120	105	90	128
20	240	240	132	770	995	1,970	1,120	120	120	105	90	128
21	240	240	128	880	1,120	1,820	1,120	120	120	105	90	128
22	240	240	128	995	1,240	1,660	995	120	120	105	90	128
23	258	270	128	995	1,240	1,520	880	140	120	99	90	128
24	258	305	128	1,120	1,520	1,380	770	160	120	99	90	128
25	258	340	124	1,120	1,660	1,120	670	160	120	96	90	128
26	258	378	124	1,060	2,790	880	580	160	120	96	90	128
27	270	378	124	995	2,130	770	495	160	120	96	90	128
28	305	270	124	880	1,820	670	415	160	120	96	90	128
29	326	210	124	670	.....	580	415	160	120	96	90	128
30	326	160	124	580	.....	538	415	160	120	96	90	128
31	326	.....	124	495	.....	495	.....	160	.....	96	90	.....

NOTE.—Discharge determined from a well-defined rating curve.

Monthly discharge of Umatilla River near Umatilla, Oreg, for the year ending Sept. 30, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	326	120	220	13,500	A.
November	378	160	223	13,300	A.
December	210	121	153	9,410	A.
January	1,660	124	807	49,600	A.
February	2,790	210	764	42,400	A.
March	3,140	495	1,710	105,000	A.
April	1,820	415	937	55,800	A.
May	340	120	189	11,600	A.
June	160	120	130	7,740	A.
July	120	96	109	6,700	A.
August	96	90	91.4	5,620	A.
September	128	90	108	6,430	A.
The year	3,140	90	452	327,000	

NORTH FORK OF UMATILLA RIVER NEAR GIBBON, OREG.

LOCATION.—In the SW. ¼ NW. ¼ sec. 22, T. 3 N., R. 37 E., just above crossing of the South Fork trail and the junction of North and South forks of Umatilla River, about 3 miles above Weneha Springs, and about 10 miles east of Gibbon.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 17, 1912, to September 30, 1914.

GAGE.—Vertical staff.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Gravel and small boulders; probably somewhat shifting.
EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.30 feet April 11 and 18 (discharge, 177 second-feet), minimum stage recorded, 50 feet at 7 p. m. August 21 (discharge, 24 second-feet).
ACCURACY.—Results fair.
COOPERATION.—Gage-height record furnished by U. S. Forest Service, J. M. Schmitz, supervisor.

The following measurement was made by P. V. Hodges:
April 28, 1914: Gage height, 1.10 feet; discharge, 117 second-feet.

Daily discharge, in second-feet, of North Fork of Umatilla River near Gibbon, Oreg., for the years ending Sept. 30, 1912–1914.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1912.					1912.				
1					16				
2					17	115		36	
3					18				
4					19				
5					20				
6					21				
7					22	92			
8					23			34	
9					24				
10		51			25				
11					26				
12					27				
13					28				
14		46	34	34	29		36		34
15					30	70			
					31			36	

Day.	Oct.	Nov.	Dec.	Jan.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1913.											
1						285					34
2	30						140	250		44	
3											
4				70							
5											32
6	30										
7						160					
8			36								
9							390	183		42	
10									38		
11											
12	30			48		390					32
13											
14									57		
15			51					118			
16		48								42	
17							235				
18											
19				38							
20	34								54		34
21						313					
22										42	
23		38									
24					75		318				
25											
26	34					250		108			
27									44		
28								112			38
29											
30		36									
31											

Daily discharge, in second-feet, of North Fork of Umatilla River near Gibbon, Oreg., for the years ending Sept. 30, 1912–1914—Continued.

Day.	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1914.											
1											
2		60					117			26	
3											
4						129					
5	38								34		26
6			50					60			
7					164						
8										26	
9		54					162				
10											
11	57					177			34		
12											40
13											
14				50							
15		50			125			53			
16							129				
17										26	
18	47					167					
19									32		
20											
21								44		24	40
22					134						
23											
24				108			136				
25	69										
26						136			26		
27								40			
28					118	117					32
29										26	
30		72									
31							80				

NOTE.—Discharge determined from three fairly well defined rating curves applicable as follows: June 17, 1912, to May 8, 1913; May 9, 1913, to Apr. 11, 1914; and Apr. 12 to Sept. 30, 1914. Gage readings fragmentary; monthly discharge not estimated.

JOHN DAY RIVER NEAR DAYVILLE, OREG.

LOCATION.—In the SW. ¼ sec. 4, T. 13 S., R. 27 E., at a private wagon bridge about 3 miles above Dayville and the mouth of South Fork.

DRAINAGE AREA.—1,000 square miles.

RECORDS AVAILABLE.—November 23, 1908, to September 30, 1914, when station was discontinued.

GAGE.—Vertical staff.

DISCHARGE MEASUREMENTS.—Made from the private wagon bridge, to which gage is attached, or, at low water, by wading.

CHANNEL AND CONTROL.—Sand and gravel; shifting. Banks low below bridge; river overflows at about 3 feet gage height.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.7 feet at 9 a. m. March 14 (discharge, 1,070 second-feet); minimum stage recorded, 0.0 foot August 18 to September 4 (discharge, 20 second-feet).

WINTER FLOW.—Discharge relation affected by ice for short periods.

DIVERSION.—Many private ditches take water from this river above station; amount of diversion unknown.

Discharge measurements of John Day River near Dayville, Oreg., during the period Oct. 1, 1913, to Oct. 6, 1914.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Jan. 13	James E. Stewart	1.19	254
Oct. 6	C. G. Paulsen	.75	126

Daily discharge, in second-feet, of John Day River near Dayville, Oreg., for the year ending Sept. 30, 1912.

Day.	Oct.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	58	133	444	418	754	1,540	1,710	470	110	65
2	65	106	392	392	910	1,680	1,710	470	127	80
3	58	202	392	353	1,140	1,680	1,640	440	410	88
4	58	117	392	353	1,140	1,480	1,440	410	330	88
5	58	138	418	392	1,140	1,190	1,380	330	207	95
6	65	162	682	392	995	1,190	1,320	330	185	110
7	58	102	650	558	1,090	1,240	1,380	330	175	95
8	65	162	650	558	1,190	1,540	1,440	330	165	145
9	65	162	790	650	1,610	2,020	1,440	207	145	145
10	65	162	1,540	558	1,810	2,260	1,220	207	145	110
11	65	202	1,190	444	1,680	2,260	1,070	207	145	110
12	58	182	910	444	1,540	2,100	1,020	207	145	102
13	65	366	682	500	1,300	2,100	1,270	207	145	95
14	65	472	650	472	1,090	2,100	1,440	207	127	102
15	58	418	682	444	1,040	2,100	1,220	207	110	95
16	58	418	1,140	528	910	2,260	900	165	110	95
17	72	392	910	444	1,040	2,100	860	110	110	95
18	65	392	1,360	472	1,190	1,950	720	110	110	102
19	58	340	754	418	1,090	1,880	720	80	110	88
20	58	304	682	444	1,090	1,880	720	127	95	88
21	58	292	618	392	1,140	2,340	720	110	95	88
22	65	280	558	392	1,240	1,810	720	110	80	88
23	72	280	558	392	1,090	1,420	590	127	80	65
24	65	280	500	444	1,040	1,190	590	165	80	65
25	65	754	392	588	1,240	1,190	560	127	65	65
26	65	1,810	500	650	1,090	1,880	500	110	65	72
27	58	1,300	472	754	1,040	2,100	470	110	59	72
28	65	754	444	910	1,040	1,810	470	110	53	72
29	65	618	418	830	1,300	1,810	410	95	53	72
30	65	528	.....	718	1,540	2,430	470	95	53	65
31	58	500	.....	718	.....	2,010	.....	127	59	.....

Daily discharge, in second-feet, of John Day River near Dayville, Oreg., for the year ending Sept. 30, 1913.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	80	127	145	155	145	145	1,270	755	790	590	155	72
2	88	127	145	165	127	165	825	650	790	560	145	72
3	136	127	145	165	155	207	720	650	790	560	145	72
4	145	127	155	145	165	280	720	560	720	620	207	72
5	127	127	145	118	145	305	790	590	685	470	145	65
6	145	127	127	110	145	355	685	620	620	470	230	65
7	118	165	102	185	145	470	620	755	720	410	145	65
8	127	165	102	196	145	650	650	860	560	330	136	65
9	136	165	127	165	145	500	650	1,120	560	305	127	65
10	110	165	127	185	145	470	720	1,020	590	207	110	65
11	110	161	145	185	145	470	825	940	530	165	110	65
12	110	155	145	242	127	470	1,220	940	470	145	145	65
13	110	155	145	500	136	470	1,270	790	470	207	136	65
14	110	161	165	470	165	318	1,270	720	410	185	145	65
15	110	165	165	230	196	292	1,440	620	410	185	145	65
16	110	165	165	165	410	318	1,220	590	380	175	136	65
17	110	155	165	136	620	305	1,120	560	330	155	127	65
18	110	145	165	207	330	560	1,220	620	305	127	136	65
19	110	155	165	145	230	470	1,780	720	207	110	118	65
20	110	161	127	136	207	280	1,500	620	207	95	110	65
21	110	161	136	165	207	280	1,440	590	185	118	95	65
22	118	155	136	165	145	280	1,500	590	185	118	95	72
23	127	155	136	136	145	255	940	720	470	127	95	80
24	127	155	185	155	155	255	940	755	440	127	88	80
25	127	155	155	207	155	255	900	790	470	255	80	80
26	127	127	145	165	207	230	980	790	470	255	88	80
27	127	136	118	145	185	230	1,070	940	470	230	80	80
28	127	145	118	136	165	355	940	1,170	1,070	207	80	80
29	127	145	155	127	.....	790	860	1,020	755	207	80	95
30	127	145	218	145	.....	1,220	790	940	900	185	72	127
31	127	.....	185	155	.....	1,020	.....	790	.....	165	80	.....

Daily discharge, in second-feet, of John Day River near Dayville, Oreg., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	127	185	207	230	230	790	346	475	420	215	62	20
2	127	185	207	305	230	755	346	420	445	195	62	20
3	118	185	196	330	185	685	346	475	420	175	62	20
4	118	185	185	410	185	620	370	505	370	175	62	20
5	127	175	185	530	230	720	665	475	445	175	55	30
6	136	196	185	440	145	755	700	445	395	155	55	30
7	185	230	196	355	185	825	665	475	420	155	48	36
8	255	230	196	355	230	940	630	445	395	155	42	42
9	230	207	185	305	207	980	595	475	346	155	30	55
10	230	207	185	305	230	940	630	475	323	135	30	55
11	230	255	196	255	255	860	665	420	300	117	25	62
12	185	255	196	230	255	860	630	395	323	117	25	70
13	185	230	207	255	255	860	630	370	370	108	25	78
14	196	207	185	255	255	1,070	665	370	323	100	25	85
15	185	196	185	255	230	770	770	395	300	100	25	92
16	185	207	185	230	230	770	845	505	255	100	25	92
17	185	207	185	230	230	770	805	505	235	100	25	100
18	185	207	185	230	255	805	700	475	225	78	20	100
19	175	207	185	207	330	770	700	445	215	78	20	100
20	175	207	165	230	355	770	735	445	215	70	20	100
21	175	230	145	230	650	770	735	445	175	100	20	100
22	175	207	145	280	560	700	665	595	155	85	20	117
23	175	207	185	280	470	700	665	665	155	85	20	100
24	175	207	145	305	470	665	700	805	155	85	20	100
25	175	207	196	305	620	565	630	770	395	85	20	100
26	185	196	196	330	530	535	565	665	475	85	20	100
27	185	207	185	280	530	505	595	565	346	85	20	100
28	185	207	185	230	650	475	565	505	300	85	20	100
29	175	207	185	255	.....	445	535	475	255	85	20	100
30	175	207	185	255	.....	395	505	445	235	85	20	100
31	175	.....	230	230	.....	395	.....	420	.....	70	20	.....

NOTE.—Discharge determined from three rating curves applicable as follows: 1911 to May 30, 1912, fairly well defined; May 31, 1912, to Mar. 14, 1914, and Mar. 15 to Sept. 30, 1914, poorly defined.

Monthly discharge of John Day River near Dayville, Oreg., for 1912–1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
1911–12.					
October	72	58	62.5	3,840	B.
November	.....	.....	[a] 90	5,360	D.
December	.....	.....	[a] 90	5,530	D.
January	1,810	102	398	24,500	C.
February	1,540	392	682	39,200	C.
March	910	353	517	31,800	C.
April	1,810	754	1,180	70,200	C.
May	2,430	1,190	1,820	112,000	C.
June	1,710	410	1,000	59,500	C.
July	470	80	208	12,800	C.
August	410	53	127	7,810	C.
September	145	65	90.6	5,390	C.
The year	2,430	53	521	378,000	
1912–13.					
October	145	80	119	7,320	C.
November	165	127	149	8,870	C.
December	218	102	147	9,040	C.
January	500	110	184	11,300	C.
February	620	127	193	10,700	C.
March	1,220	145	409	25,100	C.
April	1,780	620	1,030	61,300	C.
May	1,170	560	768	47,200	C.
June	1,070	185	532	31,700	C.
July	620	95	260	16,000	C.
August	230	72	122	7,500	C.
September	127	65	72.2	4,300	C.
The period	1,780	65	332	240,000	

[a] Estimated.

Monthly discharge of John Day River near Dayville, Oreg., for 1912–1914—Continued.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
1913–14.					
October	255	118	177	10,900	C.
November	255	175	208	12,400	C.
December	230	145	187	11,500	C.
January	530	207	288	17,700	C.
February	650	145	328	18,200	C.
March	1,070	395	725	44,600	D.
April	845	346	620	36,900	D.
May	805	370	495	30,400	D.
June	475	155	313	18,600	C.
July	215	70	116	7,130	C.
August	62	20	31.1	1,910	D.
September	117	20	74.1	4,410	C.
The year	1,070	20	296	215,000	

JOHN DAY RIVER AT CLARNO, OREG.

LOCATION.—In the NE. ¼ sec. 32, T. 7 S., R. 19 E., at Clarno highway bridge, 14 miles east of Antelope, Oregon.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 1 to September 30, 1914.

GAGE.—Chain gage on rail of bridge.

DISCHARGE MEASUREMENTS.—Made from highway bridge.

CHANNEL AND CONTROL.—Gravel and silt; may shift in extreme flood.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period April 1 to September 30, 9.23 at 6.10 p. m. April 16 (discharge, 11,500 second-feet); minimum stage recorded, 0.90 foot, August 25 to September 6 (discharge, 130 second-feet).

WINTER FLOW.—Discharge relation slightly affected by ice.

DIVERSIONS.—Station is below practically all diversions from John Day River.

ACCURACY.—Results good.

Discharge measurements of John Day River at Clarno, Oreg., during the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 6	F. F. Henshaw	7.22	7,710	July 10	P. V. Hodges	2.22	719
May 7	P. V. Hodges	4.90	3,810	Sept. 18	do	1.78	424

Daily discharge, in second-feet, of John Day River at Clarno, Oreg., for the year ending Sept. 30, 1914.

Day	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	2,900	3,810	2,430	1,120	245	130	16	10,800	4,120	2,180	480	170	280
2	2,900	3,660	2,560	1,080	245	130	17	9,490	4,120	2,060	420	160	420
3	2,900	4,120	2,820	1,600	215	130	18	6,970	3,810	1,820	395	160	420
4	3,700	4,440	2,430	895	215	130	19	7,150	3,510	1,710	395	150	420
5	5,300	4,440	2,430	810	190	130	20	7,690	3,370	1,600	370	146	420
6	7,690	4,120	2,300	810	215	130	21	7,690	3,090	1,400	345	140	420
7	7,510	3,660	2,300	810	190	140	22	6,790	3,090	1,300	320	140	370
8	6,790	3,660	2,180	730	190	140	23	6,080	3,960	1,260	320	140	320
9	6,250	3,960	2,180	730	190	146	24	6,080	4,280	1,210	320	140	320
10	6,250	4,280	1,940	690	190	150	25	5,910	4,440	1,160	320	130	320
11	8,230	3,960	1,940	620	190	170	26	5,240	4,120	1,940	320	130	320
12	8,770	3,660	1,820	655	180	170	27	4,920	3,660	2,060	300	130	320
13	7,510	3,510	2,060	620	180	190	28	4,600	3,230	1,600	300	130	320
14	7,330	3,370	2,430	550	180	215	29	4,440	2,950	1,600	280	130	320
15	8,050	3,810	2,560	515	170	215	30	3,960	2,690	1,300	245	130	320
							31		2,430		245	130	

NOTE.—Discharge determined from a fairly well defined rating curve. Gage not installed and discharge April 1–5 estimated, by comparison with records of John Day River at McDonald.

Monthly discharge of John Day River at Clarno, Oreg., for the period April to September, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
April	10,800	2,900	6,330	377,000	B.
May	4,440	2,430	3,720	229,000	B.
June	2,820	1,160	1,950	116,000	B.
July	1,600	245	568	34,900	B.
August	245	130	169	10,400	C.
September	420	130	254	15,100	C.
The period	10,800	130	2,150	782,000	

JOHN DAY RIVER AT McDONALD, OREG.

LOCATION.—In the NW. ¼ sec. 11, T. 1 N., R. 19 E., at McDonald Ferry, half a mile below mouth of Rock Creek, 16 miles above junction with Columbia River, and 18 miles southwest of Arlington.

DRAINAGE AREA.—7,800 square miles.

RECORDS AVAILABLE.—December 16, 1904, to September 30, 1914.

GAGE.—Inclined staff in two sections on left bank, 183 feet above ferry cable.

DISCHARGE MEASUREMENTS.—Made from cable.

CHANNEL AND CONTROL.—Clean gravel and sand; shifts slightly. Banks high. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.95 feet at 6 a. m. April 17 (discharge, 11,100 second-feet); minimum stage recorded, 1.12 feet September 6–8 (discharge, 85 second-feet).

WINTER FLOW.—Discharge relation affected by ice for short periods.

DIVERSIONS.—Large part of natural low-water flow of stream diverted in the upper John Day Valley for irrigation.

ACCURACY.—Results excellent.

Discharge measurements of John Day River at McDonald, Oreg., during the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 4	P. V. Hodges	4.38	4,180
Sept. 19	....do	1.69	338

Daily discharge, in second-feet, of John Day River at McDonald, Oreg., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	204	615	950	950	1,350	5,380	3,170	4,220	2,620	2,280	227	102
2	218	570	950	850	1,350	6,900	2,980	4,220	2,620	1,970	269	96
3	208	570	850	850	1,290	7,170	2,980	4,000	3,170	1,540	204	94
4	208	570	800	950	1,170	5,380	2,980	4,220	2,980	1,060	204	94
5	232	615	750	1,680	1,120	4,680	3,780	4,680	2,980	1,000	204	94
6	275	570	660	2,040	950	5,620	5,380	4,680	2,620	950	189	85
7	354	615	660	3,570	1,060	6,380	8,010	4,220	2,450	900	189	85
8	354	615	705	2,620	900	8,010	7,450	3,780	2,280	900	185	85
9	375	705	705	2,280	850	8,300	6,900	4,000	2,280	850	180	94
10	450	850	705	1,970	1,000	8,010	6,640	4,220	2,200	800	180	94
11	660	750	705	1,820	1,060	7,170	6,640	4,220	2,120	800	176	102
12	750	750	705	1,540	1,060	6,640	8,300	4,000	1,970	750	160	110
13	660	750	660	1,290	1,230	6,120	8,010	3,780	1,820	750	144	123
14	570	800	705	1,170	1,290	6,640	7,730	3,570	1,970	750	140	137
15	570	850	705	1,120	1,290	6,900	7,730	4,000	2,280	660	127	148
16	660	750	660	1,170	1,230	6,900	8,880	4,000	2,360	570	123	156
17	660	705	660	1,170	1,170	7,450	10,700	4,220	2,280	490	123	180
18	660	660	570	1,170	1,060	7,730	9,180	3,780	2,040	490	123	199
19	660	660	554	1,120	1,290	8,300	8,010	3,780	1,900	450	120	248
20	615	660	490	1,060	1,410	7,730	7,450	3,730	1,540	450	120	375
21	570	705	450	1,170	1,540	7,450	8,300	3,370	1,410	418	113	368
22	570	705	450	1,820	2,280	7,170	7,730	3,370	1,410	375	107	347
23	554	750	506	1,820	4,000	6,900	6,900	3,570	1,350	340	107	340
24	570	750	530	2,360	3,570	6,640	6,380	4,680	1,290	292	102	340
25	570	750	554	2,280	2,980	6,120	6,380	4,450	1,230	310	107	340
26	570	705	562	2,450	4,220	5,140	5,870	4,220	1,230	310	107	340
27	570	750	570	2,280	4,680	4,680	5,380	4,000	2,120	310	102	334
28	615	800	660	2,120	4,220	4,220	5,140	3,570	2,280	286	102	310
29	615	850	705	1,750	.....	4,000	4,680	3,370	2,800	280	107	304
30	615	900	850	1,540	.....	3,780	4,450	2,980	2,620	254	102	286
31	660	.....	1,060	1,410	.....	3,370	.....	2,800	.....	227	102	.....

NOTE.—Discharge determined from a well-defined rating curve.

Monthly discharge of John Day River at McDonald, Oreg., for the year ending Sept. 30, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	750	204	510	31,400	A.
November	900	570	701	41,700	A.
December	1,060	450	678	41,700	A.
January	3,570	850	1,660	102,000	A.
February	4,680	850	1,810	101,000	A.
March	8,300	3,370	6,350	390,000	A.
April	10,700	2,980	6,450	384,000	A.
May	4,680	2,800	3,930	242,000	A.
June	3,170	1,230	2,140	127,000	A.
July	2,280	227	703	43,200	A.
August	269	102	147	9,040	B.
September	375	85	200	11,900	B.
The year	10,700	85	2,110	1,520,000	

SOUTH FORK OF JOHN DAY RIVER AT DAYVILLE, OREG.

LOCATION.—In the NW. ¼ sec. 7, T. 13 S., R. 27 E., about half a mile above highway bridge in Dayville and 1 mile above mouth.

DRAINAGE AREA.—600 square miles.

RECORDS AVAILABLE.—November 21, 1908, to September 30, 1914, when station was discontinued.

GAGE.—Vertical staff spiked to alder tree on left bank.

DISCHARGE MEASUREMENTS.—Made from cable just below gage, or by wading.

CHANNEL AND CONTROL.—Stones and gravel; likely to shift in flood.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.20 feet in the night of March 8 (discharge, 1,110 second-feet); minimum stage recorded, 0.01 foot August 14–18, 21, and September 3–6 (discharge, 7.4 second-feet).

WINTER FLOW.—Discharge relation seldom affected by ice.

DIVERSIONS.—Dayville ditch (see p. 31) carries water around the gage. Other diversions, but no records available.

ACCURACY.—Results fair.

Discharge measurements of South Fork of John Day River at Dayville, Oreg., for the period Oct. 1, 1913, to Oct. 6, 1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 13	James E. Stewart	0.76	72.9	Oct. 6	C. G. Paulsen	0.33	24.6
Oct. 5	C. G. Paulsen	.30	22.4				

Daily discharge, in second-feet, of South Fork of John Day River at Dayville, Oreg., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	16	30	41	90	73	822	307	247	116	49	11	7.8
2	17	33	39	100	68	488	307	237	237	39	11	7.8
3	17	33	26	78	40	363	307	231	123	41	11	7.4
4	17	34	24	178	63	402	402	227	98	40	11	7.4
5	17	47	28	386	55	488	558	211	102	237	11	7.4
6	17	49	32	234	37	658	685	205	102	75	11	7.4
7	21	41	36	196	65	712	633	199	116	62	11	10.6
8	30	39	30	151	62	822	607	199	114	56	10.2	10.2
9	30	38	27	96	56	877	558	205	102	50	9.0	10.2
10	29	39	27	77	65	767	607	199	92	48	10.2	10.2
11	29	39	38	56	80	767	582	181	82	63	10.2	10.6
12	27	39	34	78	80	822	558	172	86	53	9.0	10.6
13	26	38	32	73	82	767	558	159	92	39	9.0	11
14	23	38	30	75	84	822	558	162	88	36	7.4	12
15	22	37	30	72	75	822	633	167	80	34	7.4	12
16	24	36	24	68	78	877	658	172	73	30	7.4	19
17	24	36	27	66	86	877	558	148	68	25	7.4	20
18	26	39	30	66	94	877	511	138	56	29	7.4	17
19	27	39	38	62	118	877	511	123	50	25	8.2	16
20	27	39	39	54	181	877	466	114	49	23	7.8	16
21	27	39	37	118	363	822	444	114	49	25	7.4	16
22	28	39	34	215	344	767	423	121	49	25	7.8	16
23	28	39	34	175	237	767	423	138	49	25	7.8	17
24	29	39	34	143	534	685	382	143	59	25	7.8	17
25	29	39	36	146	444	582	363	146	114	25	7.8	16
26	29	39	36	156	271	534	325	138	92	23	7.8	16
27	28	39	36	123	300	466	325	121	78	17	7.8	16
28	28	39	36	94	511	423	307	105	72	16	9.8	16
29	28	43	38	94	.....	382	271	94	60	15	8.6	17
30	28	43	38	88	.....	344	257	86	50	16	8.6	17
31	28	.....	90	80	.....	344	.....	80	.....	13	7.8	.....

NOTE.—Discharge determined from a fairly well defined rating curve.

Monthly discharge of South Fork of John Day River at Dayville, Oreg., for the year ending Sept. 30, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	30	16	25.0	1,540	B.
November	49	30	38.7	2,300	B.
December	90	24	34.9	2,150	B.
January	386	54	119	7,320	A.
February	534	37	162	9,000	B.
March	877	344	674	41,400	C.
April	685	257	469	27,900	B.
May	247	80	161	9,900	B.
June	237	49	86.6	5,150	A.
July	237	13	41.3	2,540	A.
August	11	7.4	8.92	548	B.
September	20	7.4	13.2	786	A.
The year	877	7.4	153	111,000	

DAYVILLE DITCH AT DAYVILLE, OREG.

LOCATION.—In the NW. ¼ sec. 7, T. 13 S., R. 27 E., directly opposite gage on South Fork of John Day River at Dayville.

RECORDS AVAILABLE.—June 7, 1910, to September 30, 1914, when station was discontinued.

GAGE.—Vertical staff.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Gravel; changes somewhat.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.24 feet at 4 p. m. November 5 (discharge, 2.1 second-feet); ditch dry at various times.

ACCURACY.—Results poor.

Discharge measurements of Dayville ditch at Dayville, Oreg., during the period Oct. 1, 1913, to Oct. 6, 1914.

[Made by C. G. Paulsen.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 5	0.95	0.5	Oct. 5	1.20	1.2
5	1.60	2.9	6	.82	.2

Daily discharge, in second-feet, of Dayville ditch at Dayville, Oreg., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.6	0.6	1.3	0.0	0.3	0.0	0.7	0.6	0.6
2	.5	1.0	1.2	.0	.3	.0	.7	.6	.7
3	.7	1.0	.7	.0	.5	.0	.4	.6	.7
4	.7	1.0	.7	.0	.5	.0	.9	.6	.7
5	1.2	2.1	.8	1.4	.8	.0	.5	.6	.7
6	1.2	1.9	.9	.2	.8	.0	.0	.6	.7
7	.7	1.5	1.0	.6	1.0	.0	.0	.6	.8
8	.7	1.3	.8	.4	1.7	.2	.6	.7	.9
9	.7	1.3	.7	.6	1.9	.2	.6	.7	.9
10	.7	1.3	.7	.6	1.8	.6	.5	.4	.9
11	.7	1.3	1.0	.5	1.6	.2	.5	.7	.9
12	.6	1.3	1.0	.4	1.4	.2	.0	1.1	1.1
13	.6	1.3	.9	.4	1.3	.4	.0	1.1	1.1
14	.6	1.2	.8	.3	1.2	.5	.4	.6	1.2
15	.6	1.2	.7	.4	.9	.7	.3	.6	1.2
16	.7	1.1	.5	.4	.4	.6	.3	.6	.6
17	.7	1.1	.6	.2	1.3	.6	.7	.6	.2
18	.7	1.2	.8	.2	1.0	.6	.8	.6	.2
19	.7	1.2	.8	.2	.8	.8	1.1	.4	.2
20	.7	1.2	.7	.2	.8	.9	1.4	.4	.2
21	.7	1.2	.7	.3	.8	1.1	.3	.4	.2
22	.7	1.2	.7	.3	.8	1.1	.3	.6	.2
23	.7	1.2	.7	.6	.7	1.1	.4	.6	.2
24	.7	1.2	.7	.6	.0	.9	.4	.6	.2
25	.7	1.2	.7	.4	.0	.0	.4	.6	.2
26	.7	1.2	.7	.4	.0	.0	.4	.6	.2
27	.7	1.2	.7	.2	.0	.0	.8	.6	.2
28	.7	1.2	.7	.4	.0	.0	.8	.8	.2
29	.7	1.3	.7	.4	.6	.0	.8	.7	.2
30	.7	1.3	.6	.4	.6	.6	.8	.7	.2
31	.7	.....	.2	.....	.6	.....	.6	.6	.....

NOTE.—Discharge determined from two well-defined rating curves, but considerable doubt exists as to the exact time for which each curve is applicable.

Monthly discharge of Dayville ditch at Dayville, Oreg., for the year ending Sept. 30, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	1.2	0.5	0.71	43.7
November	2.1	.6	1.24	73.8
December	1.3	.2	.76	46.7
January	.0	.0	.0	.0
February	.0	.0	.0	.0
March	.0	.0	.0	.0
April	1.4	.0	.37	22.0
May	1.9	.0	.79	48.6
June	1.1	.0	.36	22.6
July	1.4	.0	.53	32.6
August	1.1	.4	.63	38.7
September	1.2	.2	.55	32.7
The year	2.1	.0	.50	361

CAMAS CREEK ABOVE CABLE CREEK, NEAR UKIAH, OREG.

LOCATION.—In the SE. ¼ sec. 4, T. 5 S., R. 32 E., at highway bridge 200 feet above mouth of Cable Creek, 6 miles east of Ukiah.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 1 to September 30, 1914.

GAGE.—Vertical staff on abutment of highway bridge.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading.

CHANNEL AND CONTROL.—Rock and gravel; probably permanent.

EXTREMES OF STAGE.—Maximum stage recorded May 1 to September 30, 2.80 feet at 8 a. m. June 13; minimum stage recorded, 0.50 foot August 28–31.

WINTER FLOW.—Stream freezes almost solid during severe winter weather.

DIVERSIONS.—Practically none.

The following measurements was made by Hodges and Hinkle:

May 1, 1914: Gage height, 1.75 feet; discharge, 122 second-feet.

Estimates withheld for additional data.

Daily gage height, in feet, of Camas Creek above Cable Creek, near Ukiah, Oreg., for the year ending Sept. 30, 1914.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1	1.75	1.10	1.00	0.65	0.52	16	1.75	2.00	0.80	0.52	0.78
2	1.80	1.10	1.00	.60	.52	17	1.60	1.80	.75	.52	.80
3	1.90	1.40	1.00	.60	.52	18	1.55	1.70	.75	.52	.75
4	1.90	1.25	1.10	.60	.52	19	1.50	1.70	.70	.52	.75
5	1.85	1.25	1.10	.60	.52	20	1.45	1.50	.70	.52	.78
6	1.75	1.20	.95	.60	.55	21	1.40	1.40	.70	.52	.75
7	1.70	1.30	.90	.60	.55	22	1.40	1.40	.70	.55	.70
8	1.70	1.30	.95	.60	.62	23	1.40	1.30	.70	.55	.68
9	1.85	1.30	.90	.60	.62	24	1.50	1.30	.70	.55	.68
10	1.80	1.30	.90	.60	.60	25	1.45	1.30	.70	.55	.68
11	1.70	1.25	.85	.55	.60	26	1.40	1.25	.65	.55	.68
12	1.65	1.25	.95	.55	.65	27	1.30	1.20	.65	.52	.68
13	1.60	2.65	.85	.55	.62	28	1.30	1.10	.65	.50	.68
14	1.60	2.45	.82	.55	.65	29	1.20	1.10	.65	.50	.68
15	1.75	2.20	.80	.55	.82	30	1.20	1.10	.65	.50	.68
						31	1.15	.....	.65	.50	.....

CAMAS CREEK BELOW CABLE CREEK, NEAR UKIAH, OREG.

LOCATION.—In the SE. ¼ sec. 4, T. 5 S., R. 32 E., 6 miles east of Ukiah, 200 feet below mouth of Cable Creek.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 1 to September 30, 1914

GAGE.—Vertical staff nailed to a tree.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Gravel and rock; uneven but practically permanent.

EXTREMES OF STAGE.—Maximum stage recorded May 1 to September 30, 2.50 feet at 8 a. m. June 13; minimum stage recorded, 0.28 foot September 1–7.

WINTER FLOW.—Creek frozen almost solid in severe winter weather.

DIVERSIONS.—Practically none.

The following discharge measurement was made by Hodges and Hinkle:
May 1, 1914. Gage height, 1.62 feet; discharge, 200 second-feet.
Estimates withheld for additional data.

Daily gage height, in feet, of Camas Creek below Cable Creek, near Ukiah, Oreg., for the year ending Sept. 30, 1914.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1	1.61	0.90	0.85	0.45	0.28	16	1.60	1.80	0.60	0.32	0.50
2	1.68	.90	.80	.40	.28	17	1.50	1.50	.55	.32	.60
3	1.80	1.20	.80	.40	.28	18	1.40	1.40	.55	.32	.50
4	1.70	1.10	.90	.40	.28	19	1.40	1.40	.50	.32	.50
5	1.70	1.10	.90	.40	.28	20	1.35	1.30	.50	.32	.52
6	1.60	.90	.80	.40	.28	21	1.25	1.20	.50	.30	.50
7	1.60	1.10	.70	.40	.28	22	1.20	1.20	.50	.32	.45
8	1.60	1.10	.75	.40	.40	23	1.20	1.10	.50	.32	.45
9	1.75	1.10	.70	.40	.40	24	1.30	1.10	.50	.32	.45
10	1.70	1.10	.70	.40	.35	25	1.30	1.10	.50	.32	.42
11	1.60	.95	.70	.35	.35	26	1.20	1.05	.45	.32	.42
12	1.52	.95	.70	.35	.42	27	1.10	1.00	.45	.30	.42
13	1.50	2.45	.70	.35	.40	28	1.10	.95	.45	.30	.40
14	1.50	2.20	.65	.35	.42	29	1.00	.90	.45	.30	.40
15	1.60	2.00	.60	.35	.52	30	1.00	.90	.45	.30	.40
						31	.95	.....	.45	.30	.....

CABLE CREEK NEAR UKIAH, OREG.

LOCATION.—In the NE. ¼ sec. 9, T. 5 S., R. 32 E; at highway bridge, about 1,000 feet above the mouth of the creek, about 6 miles east of Ukiah.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 1 to September 30, 1914.

GAGE.—Vertical staff on abutment of bridge.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading.

CHANNEL AND CONTROL.—Gravel and rock; uneven but practically permanent.

EXTREMES OF STAGE.—Maximum stage recorded May 1 to September 30, 1.40 feet at 8 a. m. June 13; minimum stage recorded, 0.05 foot August 11 to September 7.

WINTER FLOW.—Stream freezes and may go almost dry in extremely cold weather.

DIVERSIONS.—Probably none.

The following measurement was made by Hodges and Hinkle:
May 1, 1914. Gage height, 1.00 foot; discharge, 65.5 second-feet.
Estimates withheld for additional data.

Daily gage height, in feet, of Cable Creek near Ukiah, Oreg., for the year ending Sept. 30, 1916.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1	1.00	0.45	0.40	0.15	0.05	16	0.80	0.90	0.25	0.05	0.25
2	1.02	.45	.40	.10	.05	17	.75	.80	.20	.05	.25
3	1.10	.60	.40	.10	.05	18	.70	.70	.20	.05	.20
4	1.10	.50	.40	.10	.05	19	.70	.70	.20	.05	.18
5	1.12	.50	.40	.10	.05	20	.65	.70	.20	.05	.20
6	.95	.50	.30	.10	.05	21	.60	.65	.20	.05	.20
7	.95	.55	.30	.10	.05	22	.60	.60	.20	.05	.18
8	1.00	.55	.35	.10	.12	23	.60	.60	.20	.05	.15
9	1.00	.55	.30	.10	.12	24	.65	.60	.20	.05	.15
10	.95	.55	.30	.10	.10	25	.65	.60	.20	.05	.12
11	.90	.50	.30	.05	.08	26	.60	.55	.15	.05	.12
12	.82	.55	.30	.05	.10	27	.50	.50	.15	.05	.12
13	.80	1.30	.30	.05	.10	28	.50	.50	.15	.05	.12
14	.80	1.10	.25	.05	.12	29	.50	.50	.15	.05	.12
15	.85	1.00	.25	.05	.28	30	.50	.50	.15	.05	.12
						31	.45	.....	.15	.05	.....

DESCHUTES RIVER AT CRANE PRAIRIE, NEAR LAPINE, OREG.

LOCATION.—In sec. 8, T. 21 S., R. 8 E., at outlet of Crane Prairie, above site of proposed dam and below mouth of Cultus River, about 28 miles west of Lapine by road.

DRAINAGE AREA.—Indeterminate.

RECORDS AVAILABLE.—January 1 to September 30, 1914, with some fragmentary readings 1907–1913.

GAGE.—Vertical staff on bent of footbridge.

DISCHARGE MEASUREMENTS.—Made from footbridge.

CHANNEL AND CONTROL.—Sand and gravel; somewhat shifting; weed-affected.

EXTREMES OF DISCHARGE.—Maximum stage recorded January 1 to September 30, 220 feet May 26 and June 8 (discharge, 388 second-feet); minimum stage recorded, 1.55 feet at 11 a. m. February 9 (discharge, 238 second-feet).

WINTER FLOW.—Discharge relation occasionally affected by ice.

ACCURACY.—Results good.

Discharge measurements of Deschutes River at Crane Prairie, near Lapine, Oreg., for the period July 29, 1907 to Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
July 29, 1907	Redfield and King	.....	463	Oct. 28, 1913	R. R. Randell	2.11	363
July 20, 1912	H. Kimble	2.30	445	Apr. 4, 1914	P. V. Hodges	1.80	289
June 8, 1913	James E. Stewart	2.76	494	May 31, 1914	do	2.11	340

Daily gage height, in feet, and discharge, in second-feet, of Deschutes River at Crane Prairie, near Lapine, Oreg., from Aug. 15, 1907, to Sept. 30, 1914.

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
Aug. 15, 1907	2.3	414	Nov. 3, 1908	1.95	324
23, 1907	2.3	414	4, 1908	1.95	324
Sept. 3, 1907	2.3	414	5, 1908	1.95	324
June 14, 1908	2.3	414	Aug. 10, 1912	2.35	427
Oct. 24, 1908	2.0	336	July 19, 1913	2.35	427
25, 1908	2.0	336	31, 1913	[a] 2.75	531
Nov. 1, 1908	1.95	324	Sept. 16, 1913	2.50	466
2, 1908	1.95	324	17, 1913	2.49	463

[a] From high-water mark observed Sept. 15; date approximate.

Daily discharge, in second-feet, of Deschutes River at Crane Prairie, near Lapine, Oreg., for the year ending Sept. 30, 1914.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		258				368	312		
2			252			371	312	331	
3						375	312		
4				294	349	378	312		
5	301					382	312		
6						385	312		
7						388	312		
8						382	312		
9		238				377	312	331	331
10			268			371	324		
11					336	366	324		
12	268			290		360	324		
13						355	324		
14						349	324		331
15						344	324		
16		248				340	324	336	
17			286		375	336	324		
18						332	324		
19	279			331		328	324		
20						324	325		331
21						327	326		
22						330	327		
23						333	328	336	
24		248	279			336	329		
25						336	330		
26	290			375	388	324	331		324
27						324	331		
28						324	331		
29						312	331		
30						312	331	336	
31					365		331	331	

NOTE.—Discharge determined from a fairly well defined rating curve. Discharges during July, August, and September are perhaps too large, owing to effect of weeds on discharge relation.

Monthly discharge of Deschutes River at Crane Prairie, near Lapine, Oreg., for the period Jan. to Sept., 1914.

Month.	Mean discharge in second-feet.	Run-off (total in acre-feet).	Accuracy.	Month.	Mean discharge in second-feet.	Run-off (total in acre-feet).	Accuracy.
January	284	17,500	B.	July	323	19,900	B.
February	248	13,800	B.	August	334	20,500	C.
March	271	16,700	B.	September	329	19,600	C.
April	322	19,200	B.				
May	363	22,300	B.	The period		170,000	
June	349	20,800	B.				

NOTE.—Mouthly mean discharge obtained by taking mean of observations January to May, August, and September.

DESCHUTES RIVER [1] NEAR LAVA, OREG.

LOCATION.—In the NE. ¼ sec. 24, T. 20 S., R. 10 E., about 1½ miles west of the former Lava post office, 1½ miles above the mouth of East Fork or Little River as it is locally known.

DRAINAGE AREA.—Indeterminate.

RECORDS AVAILABLE.—February 20, 1905, to April 14, 1907; April 23, 1909, to January 21, 1911; February 23 to May 3, 1912; October 18, 1913, to September 30, 1914.

GAGE.—Inclined staff on right bank.

[1] Formerly known as West Fork of Deschutes River.

DISCHARGE MEASUREMENTS.—Made from bridge at ranger station, about 3 miles by road above the gage.

CHANNEL AND CONTROL.—Sand and gravel; somewhat shifting; weed-affected.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.3 feet at 11 a. m. November 8 (discharge, 1,220 second-feet); minimum stage recorded, 8.4 feet February 8 and 15; but minimum discharge of 980 second-feet was on March 29 and 30, the minimum stage and discharge not occurring at the same time owing to a shift in channel.

WINTER FLOW.—Ice rarely forms on this stream.

ACCURACY.—Results good with only slight uncertainties due to changes in discharge relation caused by backwater from East Fork.

Discharge measurements of Deschutes River near Lava, Oreg., for the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 27	R. R. Randell	8.98	1,140	Aug. 16	James E. Stewart	8.52	1,020
Apr. 1	Hodges and Henshaw	8.60	1,000				

Daily discharge, in second-feet, of Deschutes River near Lava, Oreg., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		1,150			1,060	1,060	980					
2											1,030	
3								1,020				
4				1,100								
5							1,020			1,070		1,030
6			1,100									
7									1,140			
8		1,220			1,010	1,060						
9											1,030	
10								1,030				
11				1,060								
12							1,030			1,060		1,030
13			1,080									
14									1,100			
15		1,150			1,010	1,080						
16											1,030	
17												
18	1,180			1,060				1,060				
19							1,060			1,040		1,060
20												
21									1,080			
22		1,150			1,030	1,080						
23											1,030	
24								1,090				
25	1,150			1,080								
26							1,060			1,030		
27	1,150											1,030
28			1,060						1,080			
29		1,150				980					1,030	
30												
31								1,060			1,040	

NOTE.—Discharge determined from two well-defined rating curves as follows: Curve No. 1, applicable when the discharge of East Fork is less than 400 second-feet, used Oct. 18, 1913, to Mar. 15, 1914, and June 1 to Sept. 30, 1914; No. 2, applicable when discharge of East Fork exceeds 400 second-feet, used Mar. 22 to May 30, 1914.

Monthly discharge of Deschutes River near Lava, Oreg., for the year ending Sept. 30, 1914.

Month.	Mean discharge in second-feet.	Run-off (total in acre-feet).	Accuracy.	Month.	Mean discharge in second-feet.	Run-off (total in acre-feet).	Accuracy.
October	1,160	71,300	B.	May	1,050	64,600	B.
November	1,160	69,000	B.	June	1,100	65,500	B.
December	1,080	66,400	B.	July	1,050	64,600	B.
January	1,080	66,400	B.	August	1,030	63,300	B.
February	1,030	57,200	B.	September	1,040	61,900	B.
March	1,050	64,600	B.				
April	1,030	61,300	B.	The year	1,070	776,000	

NOTE.—Monthly mean discharge obtained by taking mean of observations.

DESCHUTES RIVER AT WEST'S RANCH, NEAR LAVA, OREG.

LOCATION.—In the SW. ¼ sec. 31, T. 19 S., R. 11 E., at private bridge on B. F. West's ranch, about 16 miles above Bend and about 7 miles by river above Benham Falls, one-half mile below Spring Creek and 2 miles below East Fork.

DRAINAGE AREA.—Indeterminate.

RECORDS AVAILABLE.—July 21, 1906, to February 20, 1909; April 2 to September 30, 1914, when station was discontinued.

GAGE.—Vertical staff spiked to bridge approach on right bank; datum used in 1914 bears no determined relation to that previously used.

DISCHARGE MEASUREMENTS.—Made from private wagon bridge of logs and poles.

CHANNEL AND CONTROL.—Sand and gravel; somewhat shifting; weed-affected.

EXTREMES OF DISCHARGE.—Maximum stage recorded April 1 to September 30, 1914, 1.35 feet April 18, 26, and May 24 (discharge, 1,700 second-feet), minimum stage recorded, 0.60 foot August 30 to September 13 (discharge, 1,350 second-feet).

WINTER FLOW.—Discharge relation unaffected by ice.

ACCURACY.—Results good.

Discharge measurements of Deschutes River at West's ranch, near Lava, Oreg., for the period Oct. 1, 1913, to Nov. 2, 1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 2	Henshaw and Hodges	1.01	1,550	Aug. 15	James E. Stewart	0.64	1,370
June 2	P. V. Hodges	1.20	1,620	Nov. 2	do	.62	1,320

Daily discharge, in second-feet, of Deschutes River at West's ranch, near Lava, Oreg., for the year ending Sept. 30, 1914.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1							16					1,370	
2	1,530	1,630	1,630		1,370		17		1,680				
3							18	1,700					
4							19				1,410		
5				1,460			20						1,390
6						1,350	21			1,500			
7	1,600		1,630				22						
8							23					1,370	
9					1,370		24		1,700				
10		1,630					25						
11							26	1,700			1,390		
12	1,630			1,430			27						1,370
13						1,350	28			1,500			
14			1,580				29						
15							30					1,350	
							31		1,660				

NOTE.—Discharge determined from a well-defined rating curve.

Monthly discharge of Deschutes River at West's ranch, near Lava Oreg., for the period April to September, 1914.

Month.	Mean discharge in second-feet.	Run-off (total in acre-feet).	Accuracy.	Month.	Mean discharge in second-feet.	Run-off (total in acre-feet).	Accuracy.
April	1,630	97,000	B.	August	1,370	84,200	B.
May	1,660	102,000	B.	September	1,360	80,900	B.
June	1,570	93,400	B.				
July	1,420	87,300	B.	The period		545,000	

NOTE.—Monthly mean discharge obtained by taking mean of observations.

DESCHUTES RIVER AT BENHAM FALLS, NEAR BEND, OREG.

LOCATION.—In the NE. ¼ sec. 16, T. 19 S., R. 11 E., about 250 yards above Benham Falls and just below the dam site of the proposed Benham Falls reservoir, 14 miles above Bend.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 30, 1909, to September 30, 1914. Records at this station are comparable with those at West's ranch, 7 miles upstream by river, July 21, 1906, to February 20, 1909, and April 2 to September 30, 1914.

GAGE.—Vertical staff on right bank.

DISCHARGE MEASUREMENTS.—Made from cable near gage.

CHANNEL AND CONTROL.—Sand and gravel; somewhat shifting; weed-affected.

EXTREMES OF DISCHARGE.—Maximum discharge for year 1,900 second-feet, April 24; minimum discharge, 1,250 second-feet, August 16 and 17.

WINTER FLOW.—Discharge relation not materially affected by ice.

DIVERSIONS.—Only a small amount of diversion above the station.

ACCURACY.—Results good.

Discharge measurements of Deschutes River at Benham Falls, near Bend, Oreg., for the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec. ft.*			*Feet.*	*Sec. ft.*
Apr. 8	P. V. Hodges	4.38	1,750	Aug. 17	James E. Stewart	3.92	1,390
June 3	do	4.42	1,690				

NOTE.—The following gage heights were observed: Apr. 2, gage height 4.28 feet, discharge 1,630 second-feet; Aug. 31, gage height 3.89 feet, discharge 1,370 second feet.

Daily discharge, in second-feet, of Deschutes River at Benham Falls, near Bend, Oreg., for the year ending Sept. 30, 1914.

Day.	Oct.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,610	.....	.....	.....	.....	1,630	1,740	1,640	.....	1,320	1,310
2	1,530	.....	.....	.....	.....	1,620	1,740	1,640	.....	.....	1,310
3	1,530	1,460	.....	.....	.....	1,580	1,700	1,680	.....	1,320	1,320
4	1,540	.....	.....	.....	.....	1,600	1,680	1,640	1,440	1,280	1,340
5	1,540	.....	.....	.....	.....	1,600	1,690	1,610	1,420	1,280	1,310
6	1,540	.....	.....	.....	.....	1,600	1,660	1,650	1,400	.....	1,310
7	1,640	.....	.....	.....	.....	1,600	1,620	1,650	1,420	1,280	1,330
8	1,640	.....	.....	.....	.....	1,600	1,610	1,650	1,460	1,280	1,310
9	1,640	.....	.....	.....	.....	1,500	1,620	1,640	1,490	1,320	.....
10	1,640	.....	.....	.....	.....	1,550	1,620	1,650	1,450	1,320	.....
11	1,640	.....	.....	.....	.....	1,740	1,620	1,610	1,440	1,270	.....
12	1,640	.....	.....	.....	.....	1,750	1,630	1,610	1,460	1,270	.....
13	1,640	.....	.....	.....	.....	1,780	1,630	1,610	1,500	1,270	.....
14	1,540	1,490	.....	.....	.....	1,720	1,630	1,570	1,410	1,320	.....
15	1,540	.....	.....	.....	1,800	.....	1,670	1,560	1,370	1,280	.....
16	1,540	.....	.....	1,430	1,750	1,720	1,690	1,560	1,370	1,250	.....
17	1,540	.....	.....	1,430	1,770	1,720	1,690	1,560	1,370	1,250	.....
18	1,540	.....	.....	1,430	1,700	1,830	.....	1,510	1,350	1,260	.....
19	1,540	.....	1,480	1,430	1,760	1,880	.....	1,490	1,340	1,320	1,390
20	1,540	.....	1,480	1,430	1,700	1,860	1,730	1,480	1,320	1,320	1,390
21	1,560	.....	1,530	1,430	1,620	1,800	1,690	1,490	1,360	1,320	1,390
22	.....	1,430	1,520	1,430	1,680	1,800	1,650	1,490	1,360	1,360	1,390
23	.....	1,430	1,480	1,430	1,830	1,860	1,680	1,490	1,330	1,340	1,350
24	.....	1,430	1,540	1,450	1,770	1,900	1,680	1,490	1,340	1,340	1,350
25	1,540	1,430	1,540	1,450	1,770	1,840	1,730	1,490	1,340	1,340	.....
26	1,540	1,540	1,540	1,480	1,770	1,860	1,730	1,530	1,300	1,340	1,390
27	1,540	1,540	1,540	.....	1,650	1,890	1,730	1,490	1,300	1,340	1,470
28	1,540	1,480	1,480	1,470	1,670	1,890	1,780	1,490	1,300	1,340	1,430
29	1,540	1,450	1,430	.....	1,640	1,770	1,730	1,490	1,310	1,340	1,390
30	1,540	1,560	1,430	.....	1,590	1,740	1,680	1,490	1,310	1,330	1,340
31	1,540	1,540	1,430	.....	1,660	.....	1,650	.....	1,280	1,320	.....

NOTE.—No observer was available. Discharge determined by adding to the discharge at Bend the amount diverted in the Arnold, Central Oregon, and Pilot Butte canals. For certain days when the diversions were variable the combined values were too large or too small and no discharge is given.

Monthly discharge of Deschutes River at Benham Falls, near Bend, Oreg., for the year ending Sept. 30, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	1,640	1,530	1,570	96,500	B.
November	.....	.....	1,580	94,000	C.
December	.....	.....	1,450	89,200	B.
January	.....	.....	1,530	94,100	B.
February	.....	.....	1,450	80,500	B.
March	1,830	.....	1,640	101,000	B.
April	1,900	1,500	1,730	103,000	B.
May	1,780	1,610	1,690	104,000	B.
June	1,680	1,480	1,570	93,400	B.
July	1,500	1,280	1,380	84,800	B.
August	1,360	1,250	1,310	80,600	B.
September	1,470	1,310	1,360	80,900	B.
The year	1,900	1,250	1,520	1,100,000	

NOTE.—Monthly mean discharge determined by combining the monthly mean discharge of Deschutes River at Bend and the Arnold, Central Oregon, and Pilot Butte canals.

DESCHUTES RIVER AT BEND, OREG.

LOCATION.—In the NE. ¼ sec. 32, T. 17 S., R. 12 E., just below the power house of the Bend Water Light & Power Co., at former city pumping plant, at Bend, Oreg., 1 mile above the diversion dam of the North canal of the Central Oregon Irrigation Co.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 23, 1907, to October 8, 1910, and October 1, 1911, to September 30, 1914, at gage below power house; December 22, 1904, to March 30, 1907, at Sizemore's bridge; October 1, 1910, to April 10, 1912, at gage above dam.

GAGE.—At pumping plant, vertical staff bolted to a boulder; above dam, vertical staff nailed to pier of bridge over pond, near right bank, zero level with crest; at Sizemore's bridge (prior to 1907) vertical staff spiked to bent.

DISCHARGE MEASUREMENTS.—Made from a bridge a short distance above gage. Prior to August 24, 1912, made from Staat's bridge three-fourths mile above the gage; October 18, 1912, to June 1, 1913, from a cable at gage.

CHANNEL AND CONTROL.—Somewhat shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.85 feet at 6 p. m. March 23 (discharge, 1,830 second-feet); minimum stage recorded, 0.70 foot from water-stage recorder at 11 a. m. August 2 (discharge, 760 second-feet).

WINTER FLOW.—Discharge relation not seriously affected by ice.

DIVERSIONS.—The Arnold, Pilot Butte, and Central Oregon canals divert above station. Records of these diversions available. No other important diversions.

ACCURACY.—Results good.

Discharge measurements of Deschutes River at Bend, Oreg., during the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 25[a]	R. R. Randell	1.42	1,330	July 12	P. V. Hodges	1.08	1,060
Dec. 14	F. F. Henshaw	1.36	1,290	18	do	.81	916
Mar. 30	P. V. Hodges	1.68	1,670	Aug. 19	James E. Stewart	.87	881
31	Hodges and Henshaw	1.55	1,460	20[a]	do	.87	839
June 6	P. V. Hodges	1.30	1,240	20[b]	do	.87	871

[a] Measured at highway bridge above backwater of dam.
[b] Measured by wading below North canal dam, discharge of North and Swalley canals added.

Daily discharge, in second-feet, of Deschutes River at Bend, Oreg., for the yea ending Sept. 30, 1914.

Day.	Oct.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,430	.....	1,540	.....	.....	1,500	1,430	1,240	1,060	865	865
2	1,330	.....	1,240	.....	.....	1,480	1,430	1,240	1,430	760	865
3	1,330	1,430	1,540	.....	.....	1,430	1,380	1,280	1,020	865	883
4	1,330	.....	.....	.....	.....	1,430	1,330	1,240	1,020	830	900
5	1,330	.....	.....	.....	.....	1,360	1,330	1,200	1,000	830	865
6	1,330	.....	.....	.....	.....	1,280	1,280	1,240	980	1,150	865
7	1,430	.....	.....	.....	.....	1,280	1,240	1,240	1,060	830	900
8	1,430	.....	.....	.....	.....	1,280	1,240	1,240	1,060	830	900
9	1,430	.....	.....	.....	.....	1,330	1,240	1,240	1,060	865	.....
10	1,430	.....	.....	.....	.....	1,520	1,240	1,240	1,020	865	.....
11	1,430	.....	.....	.....	.....	1,710	1,240	1,200	1,380	900	.....
12	1,430	.....	.....	.....	.....	1,710	1,240	1,200	1,240	900	.....
13	1,430	.....	.....	.....	.....	1,650	1,240	1,200	1,100	900	.....
14	1,330	1,330	.....	.....	.....	1,480	1,240	1,150	980	865	.....
15	1,330	.....	.....	.....	1,710	1,380	1,280	1,150	940	830	.....
16	1,330	.....	.....	1,430	1,710	1,650	1,280	1,150	940	795	.....
17	1,330	.....	.....	1,430	1,770	1,650	1,280	1,150	940	795	.....
18	1,330	.....	.....	1,430	1,650	1,710	1,280	1,100	.....	795	.....
19	1,330	.....	1,480	1,430	1,600	1,660	1,600	1,060	.....	865	1,060
20	1,330	.....	1,480	1,430	1,540	1,600	1,330	1,060	900	865	1,060
21	1,330	.....	1,480	1,430	1,540	1,540	1,280	1,060	940	865	1,060
22	1,330	1,430	1,430	1,430	1,680	1,540	1,240	1,060	940	900	1,060
23	1,330	1,430	1,430	1,430	1,830	1,600	1,280	1,060	900	900	1,020
24	1,430	1,430	1,540	1,430	1,770	1,600	1,280	1,060	900	900	1,020
25	1,330	1,430	1,540	1,430	1,770	1,540	1,330	1,060	900	900	1,020
26	1,330	1,540	1,540	1,480	1,770	1,570	1,330	1,100	865	900	1,330
27	1,330	1,540	1,540	1,430	1,650	1,600	1,330	1,060	865	900	1,330
28	1,330	1,480	1,480	1,200	1,620	1,600	1,380	1,060	865	900	1,330
29	.....	1,430	1,430	.....	1,590	1,480	1,330	1,060	865	900	1,330
30	.....	1,540	1,430	.....	1,560	1,430	1,280	1,060	865	890	1,280
31	.....	1,540	.....	.....	1,530	.....	1,260	.....	830	880	.....

NOTE.—Discharge determined from a well-defined rating curve. After a study of East Fork at Allen's ranch, Deschutes River near Lava, and Spring River, the following mean daily discharge estimates were made owing to lack of gage record: Oct. 29-31, 1,330 second-feet; Nov. 1-30, 1,400 second-feet; Dec. 1-2, 1,400 second-feet; Dec. 4-13, 1,350 second-feet; Dec. 15-21, 1,400 second feet; Jan. 4-18, 1,500 second feet; Jan. 31, 1,430 second-feet; Feb. 1-15, 1,400 second-feet; Mar. 1-14, 1,550 second-feet; July 18-19, 920 second-feet; Sept. 9-18, 1,000 second-feet.

Discharge interpolated owing to lack of gage record: Oct. 5, 12, 19, and 26; Dec. 28; Feb. 22; Mar. 22; Mar. 28 to Apr. 1; Apr. 5, 10, 19, and 26; May 3 and 10; June 18, 21, and 28; July 5; Aug. 28 and 30-31; Sept 3, 20, and 27-28.

Monthly discharge of Deschutes River at Bend, Oreg., for the year ending Sept. 30, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	1,430	1,330	1,360	83,600	A.
November	.....	.....	1,400	83,300	C.
December	1,540	.....	1,410	86,700	C.
January	.....	1,240	1,490	91,600	B.
February	.....	1,200	1,410	78,300	B.
March	1,830	.....	1,610	99,000	B.
April	1,710	1,280	1,520	90,400	A.
May	1,600	1,240	1,310	80,600	A.
June	1,280	1,060	1,150	68,400	A.
July	1,430	830	990	60,900	B.
August	1,150	760	872	53,600	B.
September	1,330	865	1,030	61,300	B.
The year	1,830	760	1,290	938,000	

DESCHUTES RIVER AT TUMALO,[1] OREG.

LOCATION.—In the NE. ¼ sec. 31, T. 16 S., R. 12 E., at the highway bridge in Tumalo, 9 miles by river below Bend, 3 miles below Tumalo Creek, and below all important diversions.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January 1, 1909, to October 15, 1912; July 14 to Sept. 30, 1914. Records prior to July, 1910, questionable.

GAGE.—Vertical staff, at old highway bridge at Tumalo.

DISCHARGE MEASUREMENTS.—Made from wagon bridge, 1½ miles above gage in SE. ¼ sec. 6, T. 17 S., R. 12 E, by wading during low water of 1914.

CHANNEL AND CONTROL.—Gravel; somewhat shifting. Two channels at the gage, about two-thirds of the flow passing in the right channel in which the gage is placed. The channel divides about 200 feet above the bridge.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period July 14 to October 11, 1.50 feet at 9 a. m. October 11 (discharge, 1,330 second-feet); minimum stage recorded, 0.80 foot August 17–20 (discharge, 465 second-feet; the minimum for the year).

WINTER FLOW.—Discharge relation probably somewhat affected by ice in extremely cold weather.

DIVERSIONS.—North and Swalley canals divert between this station and that at Bend.

ACCURACY.—Results excellent.

Discharge measurements of Deschutes River at Tumalo, Oreg., during the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
July 14	P. V. Hodges	0.97	629	Aug. 21	James E. Stewart	0.83	498
17	do	.92	576				

Daily discharge, in second-feet, of Deschutes River at Tumalo, Oreg., from July 14 to Oct. 11, 1914.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1	.....	512	484	11	.....	484	671	21	570	494	956
2	.....	512	541	12	.....	541	693	22	560	484	942
3	.....	503	560	13	.....	570	726	23	550	474	914
4	.....	484	580	14	630	512	796	24	550	476	874
5	.....	484	580	15	640	493	822	25	522	479	887
6	.....	870	590	16	580	474	874	26	522	482	942
7	.....	570	600	17	570	465	900	27	512	484	1,100
8	.....	474	610	18	570	465	928	28	532	490	1,100
9	.....	484	630	19	560	465	970	29	522	496	1,110
10	.....	484	660	20	560	465	956	30	512	503	1,120
								31	512	494	.....

NOTE.—Discharge determined from a well-defined rating curve. Discharge interpolated for lack of gage readings Aug. 15, 18, 22, 24, 25, 26, 28, 29, 31; Sept. 6 and 7.

Monthly discharge of Deschutes River at Tumalo, Oreg., for the period July 14 to Sept. 30, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
July 14–31	640	512	554	19,800	A.
August	870	465	505	31,100	A.
September	1,120	484	804	47,800	A.
The period	.....	.....	.....	98,700	

[1] Formerly Laidlaw.

DESCHUTES RIVER AT MECCA, OREG.

LOCATION.—In the SW. ¼ sec. 20, T. 9 S., R. 13 E., 1½ miles below mouth of Shitike Creek and 12 miles above mouth of Warm Spring River.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 7, 1911, to September 30, 1914.

GAGE.—Vertical staff fastened to tree on right bank, 100 yards above bridge.

DISCHARGE MEASUREMENTS.—Made from highway bridge.

CHANNEL AND CONTROL.—Rock and gravel; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.65 feet at noon March 18 (discharge, 8,430 second-feet); minimum stage recorded 2.30 feet August 7, 8, 27–31, September 3–7 and 9–12 (discharge, 3,900 second-feet).

WINTER FLOW.—Discharge relation not affected by ice.

DIVERSIONS.—Flow affected by same diversions from upper Deschutes River as at the station at Tumalo. Summer flow of Crooked River practically all diverted above head of lower canyon near Terrebonne.

ACCURACY.—Results excellent.

Discharge measurements of Deschutes River at Mecca, Oreg., for the year ending Sept. 30, 1914.

[Made by P. V. Hodges.]

Date.	Gage height.	Discharge.
May 21	2.88	5,020
June 11	2.66	4,500

Daily discharge, in second-feet, of Deschutes River at Mecca, Oreg., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	4,200	4,540	4,900	4,900	5,080	7,000	5,860	5,480	4,920	4,740	4,050	4,050
2	4,370	4,540	4,900	4,900	5,080	6,800	5,860	5,290	5,100	4,560	4,050	4,050
3	4,370	4,540	4,900	4,900	4,900	6,800	5,670	5,290	5,100	4,380	4,050	3,900
4	4,370	4,900	4,900	5,080	4,900	6,800	6,250	5,100	4,740	4,380	4,050	3,900
5	4,540	5,080	4,900	5,640	4,900	6,600	6,650	5,100	4,740	4,380	4,050	3,900
6	4,370	5,080	4,900	6,020	4,900	6,800	7,890	5,100	5,100	4,380	4,050	3,900
7	5,080	4,900	4,900	6,020	4,900	7,000	7,890	5,100	4,740	4,380	3,900	3,900
8	4,720	4,900	4,720	5,640	4,720	7,000	7,260	5,100	4,740	4,560	3,900	4,050
9	4,540	5,080	4,720	5,640	4,720	7,200	7,050	5,100	4,740	4,380	4,050	3,900
10	4,540	5,080	4,540	5,640	4,540	7,200	7,260	5,100	4,740	4,380	4,050	3,900
11	4,540	4,900	4,540	5,450	4,540	7,200	7,470	5,100	4,560	4,380	4,050	3,900
12	4,540	4,900	4,540	5,080	4,540	7,410	7,470	4,920	4,740	4,380	4,050	3,900
13	4,540	4,720	4,540	4,900	4,540	7,200	7,260	4,920	4,560	4,380	4,050	4,050
14	4,540	4,720	4,540	4,900	4,540	7,200	7,050	4,920	4,560	4,210	4,050	4,050
15	4,540	4,540	4,540	4,900	4,540	7,410	7,050	5,100	4,740	4,210	4,050	4,050
16	4,540	4,540	4,720	4,900	4,540	7,620	7,050	5,100	4,740	4,210	4,050	4,380
17	4,540	4,720	4,900	5,080	4,720	8,050	7,260	5,100	4,740	4,050	4,050	4,740
18	4,540	4,900	4,900	5,080	4,720	8,180	7,050	5,100	4,740	4,050	4,050	4,380
19	4,540	4,720	4,900	4,900	4,900	8,320	6,850	5,100	4,560	4,050	4,050	4,380
20	4,540	4,720	4,900	4,900	4,900	8,100	7,050	5,100	4,380	4,050	4,050	4,380
21	4,540	4,900	4,900	4,900	5,450	7,890	6,650	4,920	4,380	4,050	4,050	4,380
22	4,540	4,900	4,900	5,830	6,400	7,890	6,450	5,100	4,380	4,050	4,050	4,380
23	4,370	4,900	4,720	5,640	5,830	7,680	6,250	5,100	4,380	4,050	4,050	4,380
24	4,540	4,900	4,720	5,450	6,020	7,470	6,050	5,100	4,380	4,050	4,050	4,380
25	4,540	4,900	4,720	5,450	6,020	7,470	5,860	5,100	4,380	4,050	4,050	4,380
26	4,540	4,900	4,720	5,260	6,020	7,260	5,860	5,290	4,380	4,050	4,050	4,560
27	4,540	4,900	4,720	5,260	5,830	7,050	5,670	5,100	4,380	4,050	3,900	4,560
28	4,540	4,900	4,900	5,260	5,640	7,050	5,480	5,100	4,380	4,050	3,900	4,380
29	4,540	4,720	4,900	5,260	.....	6,850	5,480	4,920	4,380	4,050	3,900	4,380
30	4,540	4,720	5,080	5,260	.....	6,250	5,480	4,920	4,380	4,050	3,900	4,560
31	4,540	.....	5,080	5,260	.....	6,050	.....	4,740	.....	4,050	3,900	.....

NOTE.—Discharge determined from two rating curves applicable as follows: Oct. 1 to Mar. 17, well defined from 3,500 to 6,000 second-feet; Mar. 19 to Sept. 30, well defined from 4,000 to 6,000 second-feet. Discharge interpolated Mar. 18; rating curve not applicable.

Monthly discharge of Deschutes River at Mecca, Oreg., for the year ending Sept. 30, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	5,080	4,200	4,520	278,000	A.
November	5,080	4,540	4,820	287,000	A.
December	5,080	4,540	4,800	295,000	A.
January	6,020	4,900	5,270	324,000	A.
February	6,400	4,540	5,080	282,000	A.
March	8,320	6,050	7,250	446,000	A.
April	7,890	5,480	6,610	393,000	A.
May	5,480	4,740	5,080	312,000	A.
June	5,100	4,380	4,630	276,000	A.
July	4,740	4,050	4,230	260,000	A.
August	4,050	3,900	4,020	247,000	A.
September	4,740	3,900	4,200	250,000	A.
The year	8,320	3,900	5,040	3,650,000	

DESCHUTES RIVER AT SHERAR, OREG.

LOCATION.—In the NE. ¼ sec. 3, T. 4 S., R. 14 E., opposite Sherar station on Oregon Trunk Railway.

RECORDS AVAILABLE.—February 13, 1912, to September 30, 1914, when station was discontinued.

DRAINAGE AREA.—Not measured.

GAGE.—Vertical staff on left bank.

CHANNEL.—Rocky; practically permanent.

DISCHARGE MEASUREMENTS.—No provision yet made for discharge measurements.

Station maintained to determine range of stage only. No attempt was made to obtain a rating curve, as discharge is practically the same as at Moody.

Daily gage height, in feet, of Deschutes River at Sherar, Oreg., for the year ending Sept. 30, 1914.

[G. T. Andrews, observer.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.3	1.5	1.8	1.8	2.1	3.1	2.4	2.4	1.7	1.2	.....	.....
2	1.3	1.5	1.8	1.8	2.0	3.6	2.5	2.3	1.8	1.3	.....	.....
3	1.3	1.5	1.8	1.8	2.0	3.6	2.5	2.3	1.8	1.3	.....	.....
4	1.4	1.5	1.8	.....	1.9	3.5	2.6	2.3	1.7	.....	.....	.....
5	1.4	1.6	1.7	.....	1.9	3.4	3.2	2.3	1.7	.....	.....	.....
6	1.4	1.6	1.8	.....	1.8	3.2	3.6	2.3	1.7	.....	.....	.....
7	1.9	2.0	1.8	.....	1.8	3.2	3.8	2.2	1.7	.....	.....	.....
8	1.7	2.0	1.8	.....	1.8	3.6	3.8	2.2	1.6	.....	.....	.....
9	1.6	1.9	1.6	.....	1.8	3.7	3.7	2.1	1.6	.....	.....	.....
10	1.6	1.8	1.6	.....	1.8	3.6	3.6	2.1	1.6	.....	.....	.....
11	1.6	1.8	1.6	2.2	1.8	3.7	3.6	2.1	1.6	.....	.....	.....
12	1.6	1.8	1.5	2.2	1.8	3.8	3.6	2.0	1.5	.....	.....	.....
13	1.6	1.8	1.6	2.2	1.8	3.8	3.6	2.0	1.6	.....	.....	.....
14	1.6	1.7	1.6	2.0	1.8	3.8	3.6	2.2	1.5	.....	.....	.....
15	1.6	1.6	1.6	2.0	1.9	3.8	3.7	2.1	1.4	.....	.....	.....
16	1.6	1.6	1.6	1.9	2.0	4.0	3.8	2.1	1.4	.....	.....	.....
17	1.6	1.6	1.6	1.8	2.0	4.0	3.9	2.0	1.4	.....	0.5	.....
18	1.6	1.6	1.6	1.8	2.2	4.0	3.5	2.0	1.4	.....	.5	.....
19	1.6	1.6	1.6	1.8	2.2	4.0	3.4	1.9	1.3	.....	.....	.....
20	1.6	1.6	1.6	1.8	2.2	4.0	3.2	2.0	1.3	.....	.....	1.1
21	1.6	1.6	1.6	1.8	2.3	4.0	3.1	2.0	1.3	.....	.....	1.1
22	1.6	1.6	1.6	5.0	2.8	3.8	3.0	2.0	1.3	.....	.....	1.1
23	1.6	1.6	1.6	3.0	2.6	3.8	2.8	2.0	1.2	.....	.....	1.1
24	1.6	1.6	1.6	3.0	2.4	3.8	2.8	2.0	1.2	.....	.....	1.0
25	1.6	1.6	1.6	2.9	2.5	3.7	2.7	2.1	1.3	.....	.....	1.0
26	1.6	1.7	1.6	2.8	2.5	3.7	2.7	2.0	1.3	.....	.....	1.2
27	1.5	1.7	1.6	2.6	2.6	3.6	2.6	1.9	1.3	.....	.....	1.3
28	1.6	1.7	1.6	2.4	3.0	3.6	2.5	1.8	1.3	.....	.....	1.1
29	1.5	1.8	1.6	2.3	.....	3.6	2.4	1.8	1.2	.....	.....	1.1
30	1.5	1.8	1.6	2.2	.....	3.0	2.4	1.7	1.2	.....	.....	1.2
31	1.5	.....	1.6	2.1	.....	2.6	.....	1.7	.....	.....	.....	.....

DESCHUTES RIVER AT MOODY, NEAR BIGGS, OREG.

LOCATION.—In the SE. ¼ sec. 26, T. 2 N., R. 15 E., opposite Moody railroad station, 1¼ miles above bridge of the Oregon-Washington Railroad & Navigation Co., about 5 miles southwest of Biggs, Oreg., and 1½ miles above mouth of the river.

DRAINAGE AREA.—About 9,180 square miles.

RECORDS AVAILABLE.—July 7, 1906, to September 30, 1914; October 19, 1897, to December 31, 1899, for a station near Moro, 10 miles above mouth of river, in NE. ¼ sec. 5, T. 1 S., R. 16 E. Records for 1908 and 1910 somewhat fragmentary.

GAGE.—Staff in two sections, the lower inclined, the upper vertical. At the Moro station gage was an inclined staff.

DISCHARGE MEASUREMENTS.—Made from a cable about 450 feet above gage. At Moro station made from the "free bridge" 3 miles below gage.

CHANNEL AND CONTROL.—Rock and gravel; shifting only in floods.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.1 feet in afternoon January 22 (discharge, 11,800 second-feet); minimum stage recorded, 2.1 feet August 23 to September 11 (discharge, 4,300 second-feet).

DIVERSIONS.—Summer discharge at this station has been progressively reduced since about 1904 or 1905 by diversions from the upper river. Some of this water returns, but the net reduction during midsummer is now probably 15 to 20 per cent.

ACCURACY.—Results good.

No discharge measurements made during the year.

Daily discharge, in second-feet, of Deschutes River at Moody, near Biggs, Oreg, for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	5,040	5,320	5,630	5,630	6,300	9,000	7,000	6,650	5,630	5,040	4,530	4,300
2	5,040	5,320	5,630	5,630	5,960	9,850	7,000	6,650	5,960	5,040	4,530	4,300
3	5,040	5,320	5,630	5,630	5,960	9,400	7,000	6,650	5,960	5,040	4,530	4,300
4	5,040	5,320	5,630	5,630	5,960	9,000	7,400	6,650	5,630	5,040	4,530	4,300
5	5,040	5,320	5,630	7,400	5,960	8,600	7,800	6,650	5,630	5,040	4,530	4,300
6	5,040	5,630	5,630	7,000	5,960	9,000	9,400	6,650	5,630	5,040	4,530	4,300
7	5,630	5,960	5,630	7,400	5,960	9,400	10,300	6,650	5,630	5,040	4,530	4,300
8	5,960	5,960	5,630	7,400	5,630	9,850	9,400	6,300	5,630	5,040	4,530	4,300
9	5,630	5,960	5,630	7,000	5,630	10,300	9,400	6,300	5,630	5,040	4,530	4,300
10	5,630	5,960	5,630	6,650	5,630	10,300	9,850	6,300	5,630	5,040	4,530	4,300
11	5,320	5,960	5,630	6,300	5,960	9,850	9,850	6,300	5,320	5,040	4,530	4,300
12	5,320	5,630	5,320	5,960	5,630	9,850	9,400	6,300	5,320	5,040	4,530	4,530
13	5,040	5,320	5,320	5,960	5,630	9,850	9,400	6,300	5,320	5,040	4,530	4,530
14	5,320	5,320	5,320	5,960	5,960	9,850	9,000	6,300	5,320	5,320	4,530	4,530
15	5,320	5,320	5,320	5,960	5,960	10,300	8,600	6,300	5,320	5,040	4,530	4,530
16	5,320	5,320	5,320	5,960	5,630	10,800	9,400	6,300	5,320	5,040	4,530	4,780
17	5,320	5,630	5,320	5,960	5,630	11,300	10,800	6,300	5,320	5,040	4,530	4,780
18	5,320	5,320	5,320	5,960	5,630	11,300	9,400	6,300	5,320	5,040	4,530	5,040
19	5,320	5,320	5,320	5,960	5,630	11,300	9,400	6,300	5,320	4,780	4,530	5,040
20	5,320	5,320	5,320	5,960	5,630	11,300	9,000	6,300	5,320	4,780	4,530	5,040
21	5,320	5,630	5,320	5,960	6,300	10,800	8,600	6,300	5,320	4,780	4,530	5,040
22	5,320	5,320	5,630	11,800	7,000	10,800	8,600	6,300	5,320	4,530	4,530	5,040
23	5,320	5,630	5,320	8,600	7,400	10,300	8,200	6,300	5,040	4,530	4,300	4,780
24	5,320	5,630	5,320	7,800	7,000	10,300	7,800	6,300	5,040	4,530	4,300	4,780
25	5,320	5,630	5,320	7,400	7,000	9,850	7,800	6,300	5,040	4,530	4,300	4,780
26	5,320	5,630	5,320	7,800	7,400	9,000	7,400	6,300	5,040	4,530	4,300	4,780
27	5,320	5,630	5,320	7,400	7,400	8,600	7,400	5,960	5,040	4,530	4,300	4,780
28	5,320	5,630	5,320	6,650	8,200	8,200	7,400	5,960	5,040	4,530	4,300	4,780
29	5,320	5,630	5,320	6,650	.....	7,800	7,000	5,960	5,040	4,530	4,300	4,780
30	5,320	5,630	5,320	6,300	.....	7,400	7,000	5,630	5,040	4,530	4,300	4,780
31	5,320	.....	5,630	6,300	.....	7,400	.....	5,630	.....	4,530	4,300	.....

NOTE.—Discharge determined from a well-defined rating curve based on measurements made after Sept. 30, 1914.

Monthly discharge of Deschutes River at Moody, near Biggs, Oreg., for the year ending Sept. 30, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	5,960	5,040	5,310	326,000	B.
November	5,960	5,320	5,550	330,000	B.
December	5,630	5,320	5,450	335,000	B.
January	11,800	5,630	6,710	413,000	A.
February	8,200	5,630	6,210	345,000	A.
March	11,300	7,400	9,700	596,000	A.
April	10,800	7,000	8,530	508,000	A.
May	6,650	5,630	6,300	387,000	A.
June	5,960	5,040	5,370	320,000	A.
July	5,320	4,530	4,860	299,000	A.
August	4,530	4,300	4,460	274,000	A.
September	5,040	4,300	4,610	274,000	A.
The year	11,800	4,300	6,090	4,410,000	

ODELL CREEK NEAR CRESCENT, OREG.

LOCATION.—Near line, sec. 25–26, T. 23 S., R. 6 E., 6 miles from Hoey's ranch and about 18 miles from Crescent.

DRAINAGE AREA.—48 square miles.

RECORDS AVAILABLE.—August 5 to September 18, 1911; January 5 to September 28, 1912; January 4 to February 15, May 27 to November 29, 1913; and April 12 to August 12, 1914, when station was discontinued.

GAGE.—Vertical staff 500 feet below outlet; datum poorly maintained at times. A new gage 800 feet below outlet was installed June 5, 1913.

DISCHARGE MEASUREMENTS.—Made by wading near the gage.

CHANNEL AND CONTROL.—Clean gravel; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period April 12 to August 12, 0.70 foot at 5 p. m. May 27 (discharge, 123 second-feet); minimum stage recorded, 0.20 foot at 3 p. m. August 12 (discharge, 25 second-feet; this does not represent the minimum for year).

WINTER FLOW.—Discharge relation probably unaffected by ice.

ACCURACY.—Results good 1913 and 1914; earlier records somewhat uncertain.

The following measurement was made by P. V. Hodges:

May 28: Gage height, 0.67 foot; discharge, 115 second-feet.

Daily discharge, in second-feet, of Odell Creek near Crescent, Oreg., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Apr.	May.	June.	July.	Aug.
1	57	53	.....	75	110	65	38
2	57	54	.....	65	110	65	37
3	57	55	.....	65	110	65	36
4	57	57	.....	65	110	65	35
5	57	61	.....	65	110	65	33
6	57	66	.....	65	110	65	32
7	57	71	.....	65	110	55	31
8	57	75	.....	65	110	55	30
9	57	75	.....	75	110	55	29
10	57	75	.....	75	103	55	27
11	57	75	.....	75	98	55	26
12	59	75	55	75	86	55	25
13	62	75	55	75	86	55	.....
14	64	75	55	75	75	55	.....
15	64	75	55	86	75	52	.....
16	64	75	65	86	75	46	.....
17	64	75	75	93	75	46	.....
18	64	75	75	93	75	46	.....
19	61	72	75	98	75	46	.....
20	59	70	75	98	75	46	.....
21	57	67	75	98	75	46	.....
22	56	64	75	110	75	46	.....
23	55	64	75	110	75	46	.....
24	54	64	75	110	75	46	.....
25	53	64	75	110	75	46	.....
26	53	64	75	118	75	45	.....
27	53	64	75	123	75	44	.....
28	53	64	75	118	75	43	.....
29	53	64	75	110	71	42	.....
30	53	64	75	110	71	41	.....
31	53	.....	.....	110	.....	40	.....

NOTE.—Discharge determined from a fairly well defined rating curve. Discharge interpolated for lack of gage heights, Oct. 1–3, 5–6, 8–10, 12–13, 15–17, 19, 20, 22–24, 26, 27, and 29–31; Nov. 2, 3, 5–7, 9, 10, 12–14, 16, 17, 19–21, 23–24, and 26–28. Discharge estimated for lack of gage height, Nov. 30.

Monthly discharge of Odell Creek near Crescent, Oreg., for the year ending Sept. 30, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	64	53	57.5	3,540	B.
November	75	53	67.6	4,020	B.
April 12–30	75	55	70.3	2,650	B.
May	123	65	89.1	5,480	A.
June	110	71	87.7	5,220	A.
July	65	.....	51.5	3,170	B.
August 1–12	.....	.....	31.6	752	B.

EAST FORK AT CRESCENT, OREG.

LOCATION.—In the NE. ¼ SW. ¼ sec. 30, T. 24 S., R. 9 E., at the wagon bridge at Crescent, Oreg., 5 miles above mouth of Crescent Creek.

DRAINAGE AREA.—179 square miles.

RECORDS AVAILABLE.—December 25, 1904, to March 31, 1908; September 25, 1910, to October 31, 1911; February 11 to October 31, 1913; July 22 to September 30, 1914, when station was discontinued.

GAGE.—Vertical staff spiked to a pile supporting the bridge on upstream side.

DISCHARGE MEASUREMENTS.—Made by wading or from the wagon bridge to which the gage is nailed.

CHANNEL AND CONTROL.—Sand and gravel; somewhat shifting; weed-affected.

EXTREMES OF DISCHARGE.—No high-water record; minimum stage recorded, 2.12 feet August 30 to September 8 (discharge, 27 second-feet; minimum for year).
WINTER FLOW.—Discharge relation materially affected by ice.
ACCURACY.—Results good.

Data for October, 1913, published in Water-Supply Paper 362–C, p. 60.

Discharge measurements of East Fork at Crescent, Oreg., for the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 10	F. F. Henshaw	[a] 2.30	27.7	May 29	P. V. Hodges	3.22	105
May 27	P. V. Hodges	3.40	116	Aug. 6	James E. Stewart	2.22	34.4

[a] Discharge relation affected by ice.

Daily discharge, in second-feet, of East Fork at Crescent, Oreg., for the period July 22 to Sept. 30, 1914.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1	.....	36	27	11	.....	32	29	21	.....	32	39
2	.....	36	27	12	.....	32	29	22	39	32	38
3	.....	33	27	13	.....	31	29	23	39	31	36
4	.....	33	27	14	.....	31	29	24	39	29	36
5	.....	32	27	15	.....	31	32	25	39	29	32
6	.....	33	27	16	.....	31	39	26	39	29	32
7	.....	32	27	17	.....	31	42	27	39	29	32
8	.....	32	27	18	.....	31	50	28	39	29	32
9	.....	32	29	19	.....	31	46	29	39	29	32
10	.....	32	29	20	.....	31	42	30	38	27	29
								31	36	27	.....

NOTE.—Discharge determined from a well-defined rating curve.

Monthly discharge of East Fork at Crescent, Oreg., for the period July 22 to Sept. 30, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
July 22–31	39	36	38.6	766	A.
August	36	27	31.2	1,920	A.
September	50	27	32.6	1,940	A.

EAST FORK AT MORSON'S INTAKE, NEAR LAPINE, OREG.

LOCATION.—In the SE. ¼ sec. 33, T. 23 S., R. 9 E., about 500 feet below the mouth of Crescent Creek, just below site of the proposed intake for the Deschutes Land Co., Carey Act segregation, 12 miles south-west of Lapine.
DRAINAGE AREA.—Not measured.
RECORDS AVAILABLE.—May 26 to November 21, 1914.
GAGE.—Vertical staff nailed to a tree root; a water-stage recorder was temporarily installed August 12.
DISCHARGE MEASUREMENTS.—Made by wading.
CHANNEL AND CONTROL.—Gravel; may shift in floods.
EXTREMES OF DISCHARGE.—Maximum stage recorded May 26 to September 30, 5.40 feet at 3 p. m. May 26 (discharge, 384 second-feet); minimum stage recorded, 4.04 feet September 6, 14, and 15 (discharge, 84 second-feet).
WINTER FLOW.—Stream frozen two or three months; no winter records yet.
DIVERSIONS.—A few small ditches divert above the station.
ACCURACY.—Results good.

Discharge measurements of East Fork at Morson's intake, near Lapine, Oreg., for the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 26	P. V. Hodges	5.40	380	Aug. 12	James E. Stewart	4.14	97.1
29	do	5.15	331				

Daily discharge, in second-feet, of East Fork at Morson's intake, near Lapine, Oreg., for the period May 26 to Nov. 21, 1914.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		292	169	111	89	105	117
2		284	164	111	88	108	115
3		276	160	110	86	112	115
4		278	156	110	85	113	117
5		280	152	109	85	113	117
6		283	148	109	84	112	119
7		286	144	108	86	110	119
8		289	143	106	89	110	119
9		278	143	104	89	113	117
10		267	142	102	89	115	117
11		257	142	100	88	115	115
12		247	141	98	85	115	117
13		236	141	98	85	115	126
14		225	140	98	84	115	130
15		215	138	98	84	117	128
16		205	137	97	95	117	128
17		195	136	95	112	117	130
18		194	135	94	112	117	122
19		192	134	92	117	154	119
20		190	132	92	115	164	122
21		188	130	94	112	144	126
22		186	128	95	110	144	.....
23		184	126	95	108	140	.....
24		182	124	92	108	140	.....
25		180	122	95	108	140	.....
26	384	178	120	94	108	139	.....
27	361	177	118	94	108	131	.....
28	338	176	117	94	108	126	.....
29	315	175	114	92	108	124	.....
30	308	174	112	92	106	121	.....
31	300	.....	112	91	.....	117	.....

NOTE.—Discharge determined from a fairly well defined rating curve. Discharge interpolated for lack of gage readings, May 27–28; May 30 to June 2; June 4–7, 9–12, 13–16, 18–22, and 24–29; July 1, 3–6, 8–13, 15–17, 19–22, 24–27, and 29; July 31 to Aug. 6, and Aug. 8–11.

Monthly discharge of East Fork at Morson's intake, near Lapine, Oreg., for the period May 26 to Nov. 21, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
May 26–31	384	300	334	3,980	B.
June	292	174	226	13,400	B.
July	169	112	136	8,360	B.
August	111	91	99.0	6,090	B.
September	117	84	97.7	5,810	B.
October	164	105	123	7,560	B.
November 1–21	130	115	121	5,000	B.
The period	.....	.....	.....	50,200	

EAST FORK[1] AT ALLEN'S RANCH, NEAR LAVA, OREG.

LOCATION.—In the SW. ¼ SW. ¼ sec. 8, T. 20 S., R. 11 E., on C. B. Allen's ranch, about 1 mile above mouth of East Fork and about 1 mile north of former post office of Lava, Oreg., 18 miles south of Bend.

DRAINAGE AREA.—About 720 square miles.

RECORDS AVAILABLE.—February 17, 1905, to January 4, 1908; March 1, 1908, to May 4, 1912; May 27 to September 30, 1914.

GAGE.—Inclined staff on east bank of river; datum used on and after January 1, 1912, 0.10 foot higher than that previously used.

DISCHARGE MEASUREMENTS.—Made from bridge about 200 feet below gage.

CHANNEL AND CONTROL.—Sand and clay; somewhat shifting; weed-affected.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.4 feet at 12 noon April 20 (discharge, 505 second-feet); minimum stage recorded, 1.30 feet, September 1–7 (discharge, 81 second-feet).

WINTER FLOW.—Discharge relation seriously affected by ice.

ACCURACY.—Results fair.

Discharge measurements of East Fork at Allen's ranch, near Lava, Oreg., during the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 29	R. R. Randell	5.82	139	May 29	P. V. Hodges	7.20	393
Dec. 14	F. F. Henshaw	[a] 5.98	145	June 2	....do	6.85	330
Apr. 2	Henshaw and Hodges	6.58	305	Aug. 13	James E. Stewart	5.44	93.2
7	P. V. Hodges	6.73	351				

[a] Discharge relation affected by ice.

Daily discharge, in second-feet, of East Fork at Allen's ranch, near Lava, Oreg., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	158	150	172	180	210	235	285	380	310	210	111	81
2	158	150	165	220	202	275	285	380	310	202	111	81
3	150	150	180	260	188	275	275	335	310	195	106	81
4	150	143	158	290	195	275	285	335	310	195	106	81
5	150	150	172	330	195	295	315	335	310	188	100	81
6	150	195	165	310	180	295	315	335	310	188	100	81
7	165	250	172	310	172	315	335	335	330	195	100	81
8	172	310	158	310	165	335	335	335	330	195	100	86
9	202	310	136	300	165	335	355	335	330	188	100	90
10	210	270	143	260	172	335	355	335	310	188	100	90
11	195	270	172	210	195	335	380	310	290	180	100	90
12	195	250	158	210	180	335	380	310	290	165	95	90
13	188	230	150	202	180	315	380	310	290	165	95	90
14	180	195	143	220	172	315	380	310	290	165	95	90
15	180	195	130	202	165	315	405	330	250	150	95	90
16	180	180	117	202	165	335	430	350	240	143	95	95
17	172	180	123	202	180	335	455	370	230	143	95	100
18	172	180	117	195	195	355	480	370	220	136	90	123
19	165	180	111	180	180	355	505	370	220	136	90	130
20	165	180	111	180	195	355	505	350	202	136	90	130
21	158	180	117	210	210	355	480	350	202	136	90	130
22	158	165	123	210	210	380	480	350	202	136	90	123
23	158	172	117	210	230	380	480	370	210	130	90	111
24	150	180	123	250	230	380	480	395	240	123	90	111
25	150	180	123	290	240	380	480	395	250	123	90	111
26	150	180	130	290	230	355	480	395	230	123	90	106
27	150	180	123	260	240	335	455	395	220	117	86	100
28	150	188	136	260	200	315	430	370	210	117	86	100
29	136	188	136	230	.....	315	430	370	210	111	86	100
30	136	180	136	230	.....	295	405	350	195	111	86	100
31	136	.....	172	230	.....	295	.....	350	.....	111	86	.....

NOTE.—Discharge determined from two fairly well defined rating curves and by indirect method for shifting channels. First curve used Oct. 10 to Nov. 30 and May 11 to Sept. 30; second curve used Feb. 28 to Apr. 10. Indirect method used Oct. 1–9 on account of weeds; Dec. 1 to Feb. 27, on account of ice; Apr. 21 to May 10, on account of backwater from the Deschutes.

[1] Formerly known as Deschutes River.

Monthly discharge of East Fork at Allen's ranch, near Lava, Oreg., for the year ending Sept. 30, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	210	136	164	10,100	B.
November	310	143	197	11,700	B.
December	180	111	142	8,730	B.
January	330	180	240	14,800	C.
February	240	165	194	10,800	C.
March	380	235	326	20,000	B.
April	505	275	401	23,900	B.
May	395	310	352	21,600	B.
June	330	195	262	15,600	B.
July	210	111	155	9,530	B.
August	111	86	95.0	5,840	B.
September	130	81	98.4	5,860	C.
The year	505	81	219	158,000	

CRESCENT CREEK AT OUTLET OF CRESCENT LAKE, NEAR CRESCENT, OREG.

LOCATION.—In sec. 11, T. 24 S., R. 6 E., at lake outlet, about 16 miles from Crescent.

DRAINAGE AREA.—55 square miles.

RECORDS AVAILABLE.—January 11 to September 6, 1911; January 1, 1912, to September 30, 1914.

GAGE.—Vertical staff. During 1911 the gage was a vertical staff maintained by the Hunter Land Co. No determined relation between datum of gage used in 1911 and that of the gage maintained from 1912 to 1914.

DISCHARGE MEASUREMENTS.—Made by wading near the gage.

CHANNEL AND CONTROL.—Gravel; not likely to shift; some drift logs jammed at gage section at lake.

EXTREMES OF DISCHARGE.—Maximum stage recorded December 1 to September 30, 1.50 feet May 17 and 27 (discharge, 127 second-feet); minimum stage recorded, 0.80 foot August 22 and 29, and September 4 and 10 (discharge, 25 second-feet).

WINTER FLOW.—Discharge relation probably unaffected by ice.

ACCURACY.—Results fair.

Discharge measurements of Crescent Creek at outlet of Crescent Lake, near Crescent, Oreg., for the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 12	F. F. Henshaw	1.05	44.9	Aug. 8	James E. Stewart	0.95	41.2
May 27	P. V. Hodges	1.50	127.0				

Daily discharge, in second-feet, of Crescent Creek at outlet of Crescent Lake, for the year ending Sept. 30, 1914.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1			66							
2		46		66		66				
3										
4										25
5										
6							109	76		
7			66			81				
8					63				41	
9		59		63						
10										25
11	46							76		
12						97	109			
13										
14										
15			66	63	39				35	
16							109			
17		49				127		61		
18										35
19					46					
20										
21										
22	46			63					25	
23										35
24		66	66					61		
25					39		109			
26										35
27						127				
28										
29				63	39				25	
30							92	47		
31						109				

NOTE.—Discharge determined from two well-defined rating curves applicable Dec. 11 to May 16 and May 17 to Sept. 30.

Monthly discharge of Crescent Creek at outlet of Crescent Lake, near Crescent, Oreg., for the year ending Sept. 30, 1914.

Month.	Mean discharge in second-feet.	Run-off (total in acre-feet).	Accuracy.	Month.	Mean discharge in second-feet.	Run-off (total in acre-feet).	Accuracy.
October	45.0	2,770	C.	May	101	6,210	B.
November	52.0	3,090	C.	June	106	6,310	B.
December	46.0	2,830	C.	July	64.2	3,950	B.
January	55.0	3,380	B.	August	31.5	1,940	B.
February	66.0	3,670	B.	September	31.0	1,840	B.
March	63.6	3,910	B.				
April	45.2	2,690	B.	The year	58.9	42,600	

NOTE.—Mean discharge for October and November, 1913, estimated. Monthly mean discharge for remainder of year determined as mean of observations.

CRESCENT CREEK BELOW COLD CREEK, NEAR CRESCENT, OREG.

LOCATION.—In sec. 7, T. 24 S., R. 7 E., at wagon bridge half a mile below Cold Creek, 3 miles below Crescent Lake, and 3 miles above junction with Big Marsh Creek; about 14 miles from Crescent.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 30, 1912, to December 11, 1913, when station was discontinued.

GAGE.—Vertical staff on right bank 20 feet below bridge.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Gravel; somewhat shifting; a second channel to right of main stream carries a small amount of water.

EXTREMES OF DISCHARGE.—Maximum stage recorded October 1 to December 11, 1.20 feet, November 15, 18, and December 2 (discharge, 70 second-feet); minimum stage recorded, 1.05 feet October 4–11 (discharge, 52 second-feet). These figures do not represent extremes for the year.

WINTER FLOW.—Discharge relation seldom affected by ice.

ACCURACY.—Results fair.

Discharge measurements of Crescent Creek below Cold Creek, near Crescent, Oreg., during the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Dec. 12	F. F. Henshaw	1.14	62.7
Aug. 8	James E. Stewart	1.01	53.9

Daily discharge, in second-feet, of Crescent Creek below Cold Creek near Crescent, Oreg., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1		58		11	52	78	58	21	58		
2			70	12				22		64	
3				13				23			
4	52	58		14	58			24			
5				15		70		25	58	64	
6				16				26			
7	52			17				27			
8		78	64	18	58	70		28	58		
9				19				29		64	
10				20				30			
								31			

NOTE.—Discharge determined from well-defined rating curve.

Monthly discharge of Crescent Creek below Cold Creek, near Crescent, Oreg., for the period Oct. 1 to Dec. 11, 1913.

Month.	Mean discharge in second-feet.	Run-off (total in acre-feet).	Accuracy.	Month.	Mean discharge in second-feet.	Run-off (total in acre-feet).	Accuracy.
October	55.8	3,430	B.	December 1–11	64.0	1,390	B.
November	67.1	3,990	B.	The period		8,810	

NOTE.—Monthly mean discharge determined as mean of observations.

CRESCENT CREEK[1] NEAR CRESCENT, OREG.

LOCATION.—In the NW. ¼ sec. 13, T. 24 S., R. 7 E., one-eighth mile below Jones's ranch house, 4 miles below mouth of Big Marsh Creek and 9 miles west of Crescent.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 31, 1912, to October 31, 1913; July 13 to September 30, 1914.

[1] Formerly known as Deschutes River.

GAGE.—Vertical staff.

DISCHARGE MEASUREMENTS.—Made from a bridge one-fourth mile above gage, or by wading.

CHANNEL AND CONTROL.—Gravel; likely to shift.

EXTREMES OF DISCHARGE.—Maximum stage recorded July 13 to September 30, 1.60 feet at 1 p. m. July 13 (discharge, 115 second-feet); minimum stage recorded, 1.20 feet September 3–6 (discharge, 56 feet).

WINTER FLOW.—Discharge relation affected by ice.

ACCURACY.—Records good except during winter season.

Data for October, 1913, published in Water-Supply Paper 362–C, p. 69.

Discharge measurements of Crescent Creek near Crescent, Oreg., during the year ending Sept 30, 1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 11	F. F. Henshaw	1.49	98.6	Aug. 7	James E. Stewart	[a] 1.28	73.9
May 28	P. V. Hodges						

[a] On regular gage; temporary gage used during 1914 read 1.33 feet.

Daily discharge, in second feet, of Crescent Creek near Crescent, Oreg., for the period July 13 to Sept. 30, 1914.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1		76	59	11		69	59	21	92	62	81
2		76	59	12		69	59	22	92	62	81
3		76	56	13	115	69	59	23	87	62	76
4		76	56	14	112	66	62	24	87	62	72
5		76	56	15	107	66	62	25	84	62	72
6		72	56	16	102	66	92	26	84	62	76
7		72	59	17	99	62	84	27	84	62	72
8		69	59	18	99	62	84	28	81	62	72
9		69	59	19	96	62	84	29	81	59	72
10		69	59	20	96	62	84	30	81	59	72
								31	81	59	

NOTE.—No record Nov. 1 to July 12. Discharge determined from a well-defined rating curve.

Monthly discharge of Crescent Creek near Crescent, Oreg., for the period July 13 to Sept. 30, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
July 13–31	115	81	92.6	3,490	B.
August	76	59	66.4	4,080	A.
September	92	56	68.4	4,070	A.
The period				11,600	

BIG MARSH CREEK NEAR CRESCENT, OREG.

LOCATION.—In the NE. ¼ sec. 20, T. 24 S., R. 7 E., at Dellcrest ranch, one-fourth mile above junction with Crescent Creek, and about 14 miles west of Crescent.

DRAINAGE AREA.—50 square miles.

RECORDS AVAILABLE.—April 1, 1912, to September 30, 1914, when station was discontinued; records fragmentary.

GAGE.—Vertical staff on right bank.

DISCHARGE MEASUREMENTS.—Made from private wagon bridge near gage, or by wading.

CHANNEL AND CONTROL.—Cemented gravel; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.55 feet April 16–25 (discharge, 180 second-feet); minimum stage recorded, 4.65 feet August 12–27, 30, 31, September 1–8, and 15 (discharge, 14 second-feet; possibly not the absolute minimum for the year, as no record was obtained December 12 to March 31).

WINTER FLOW.—Discharge relation materially affected by ice.

ACCURACY.—Results fair.

Discharge measurements of Big Marsh Creek near Crescent, Oreg., during the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 11	F. F. Henshaw.....	[a] 5.16	33.6	Aug. 7	James E. Stewart.....	4.75	17.8
May 27	P. V. Hodges.....	5.93	105				

[a] Discharge relation affected by ice.

Daily discharge, in second-feet, of Big Marsh Creek near Crescent, Oreg., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Apr.	May.	June.	Aug.	Sept.
1	26	31	43	110	110	99	40	14
2	26	31	43	110	110	89	40	14
3	26	31	43	120	110	79	34	14
4	26	31	43	120	110	74	34	14
5	26	31	43	120	110	89	28	14
6	28	57	37	120	110	89	24	14
7	31	89	31	120	110	79	21	14
8	32	99	31	120	110	70	18	14
9	37	84	31	120	110	70	16	16
10	43	74	31	120	132	70	16	16
11	43	74	37	120	156	70	16	18
12	43	57	.....	120	156	70	14	18
13	40	57	.....	132	156	70	14	18
14	37	57	.....	132	144	70	14	18
15	37	57	.....	156	144	61	14	14
16	37	57	.....	180	144	61	14	24
17	34	57	.....	180	144	54	14	28
18	34	57	.....	180	132	54	14	34
19	31	54	.....	180	132	46	14	28
20	31	50	.....	180	120	46	14	28
21	31	50	.....	180	120	46	14	28
22	31	50	.....	180	120	46	14	28
23	31	50	.....	180	120	46	14	28
24	31	50	.....	180	120	46	14	28
25	31	50	.....	180	120	46	14	26
26	31	46	.....	156	120	46	14	26
27	31	43	.....	144	110	46	14	26
28	31	43	.....	132	99	40	18	24
29	31	43	.....	110	89	34	18	24
30	31	43	.....	110	89	34	14	24
31	31	.....	.....	.....	89	.....	14	.....

NOTE.—Discharge determined from a well-defined rating curve. Discharge relation affected by ice Dec. 2–11.

Monthly discharge of Big Marsh Creek near Crescent, Oreg., for the year ending Sept. 30, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	43	26	32.5	2,000	B.
November	99	31	53.4	3,180	B.
December 1–11	43	31	37.5	819	C.
April	180	110	143	8,510	A.
May	156	89	121	7,440	A.
June	99	34	61.3	3,650	A.
August	40	14	18.5	1,140	B.
September	34	14	21.1	1,260	B.

ARNOLD CANAL NEAR BEND, OREG.

LOCATION.—In the NE. ¼ sec. 27, T. 18 S., R. 11 E., about half a mile below intake of canal, which is at head of Lava Island Falls.

RECORDS AVAILABLE.—April 10 to September 30, 1914, with information sufficient for an approximate estimate October, 1912, to March, 1914.

GAGE.—Vertical staff on side of flume. Weir, 3 miles below, 12 feet long, with a shorter weir adjustable up to about 4 feet was read occasionally before station was regularly established.

DISCHARGE MEASUREMENTS.—Made from collar of flume, or at weir.

CHANNEL AND CONTROL.—Flume, 12 feet wide.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.10 feet August 1–10 and August 14 to September 11 (discharge, 87 second-feet); ditch dry at various times during year.

ACCURACY.—Results fair.

Discharge measurements of Arnold canal near Bend, Oreg., for the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 9	P. V. Hodges	1.33	36.5	Aug. 22	James E. Stewart	2.13	88.9
June 3	do	1.98	78.7				

Daily discharge, in second-feet, of Arnold canal near Bend, Oreg., for the year ending Sept. 30, 1914.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	52	72	65	87	87	16	41	66	66	73	87	73
2	.....	52	73	62	87	87	17	49	66	66	73	87	73
3	.....	52	73	62	87	87	18	49	66	66	73	87	73
4	.....	52	73	62	87	87	19	49	70	66	73	87	52
5	.....	52	73	62	87	87	20	49	70	66	73	87	52
6	.....	59	73	62	87	87	21	49	67	66	73	87	52
7	.....	59	74	0	87	87	22	49	67	66	73	87	52
8	.....	59	67	36	87	87	23	49	70	66	70	87	52
9	.....	59	59	73	87	87	24	49	70	66	73	87	52
10	.....	59	66	74	87	87	25	49	70	66	72	87	52
11	30	59	73	65	0	87	26	40	70	66	70	87	56
12	30	66	73	62	0	73	27	40	73	66	70	87	59
13	30	66	73	73	0	73	28	40	73	66	72	87	59
14	30	66	72	73	87	73	29	46	73	66	76	87	59
15	34	66	67	73	87	73	30	52	73	66	74	87	59
							31	.....	66	.....	86	87	.....

NOTE.—No gage height record Oct. 1 to Apr. 10. Practically no flow Dec. 1 to Mar. 28. Discharge determined from a well-defined rating curve. Mean discharge Mar. 28 to Apr. 10 estimated at 30 second-feet.

Monthly discharge of Arnold canal near Bend, Oreg., for the year ending Sept. 30, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	.....	.....	a 70	4,300	D.
November	.....	.....	a 60	3,570	D.
December	.....	.....	a 2	123	D.
January	.....	.....	0	0	
February	.....	.....	0	0	
March	.....	.....	4	246	D.
April	52	30	38.5	2,290	B.
May	73	52	64.1	3,940	A.
June	74	59	68.4	4,070	A.
July	86	0	67.0	4,120	A.
August	87	0	78.6	4,830	A.
September	87	52	70.8	4,210	A.
The year	87	0	43.8	31,700	

a Estimated from information furnished by the gage reader.

CENTRAL OREGON CANAL NEAR BEND, OREG.

LOCATION.—In the NE. ¼ sec. 7, T. 18 S., R. 12 E., at a flume about half a mile below point where waters in main diversion canal are divided between this canal and the Pilot Butte canal; about 2 miles south of Bend.

RECORDS AVAILABLE.—May 11, 1905, to September 30, 1914.

GAGE.—Vertical enameled staff nailed to inside of flume on right side.

DISCHARGE MEASUREMENTS.—Made from yoke of flume at gage.

CHANNEL AND CONTROL.—A plank flume of rectangular cross section with battened seams. Flume rather unstable, but rating curve appears not to change.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.47 feet at 5 p. m. August 18 (discharge, 337 second-feet); canal dry at various times.

WINTER FLOW.—Canal operated almost continuously; flow in winter is small. Velocity at the gage is sufficient to maintain open channel at all times.

ACCURACY.—Results good.

Discharge measurements of Central Oregon canal near Bend, Oreg., for the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft*
Oct. 30	R. R. Randell	0.90	44.3	June 5	Hodges and Schell	3.25	299
Apr. 21	P. V. Hodges	2.35	182	Aug. 18	James E. Stewart	3.47	337

Daily discharge, in second-feet, of Central Oregon canal near Bend, Oreg., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	18	42	22	42	0	91	0	233	299	164	327	313
2	35	42	28	123	0	0	0	233	299	91	327	313
3	38	42	28	85	0	0	0	246	299	246	327	313
4	42	42	28	0	0	0	24	272	299	327	327	313
5	42	42	28	0	0	0	102	285	313	327	327	313
6	42	42	28	0	0	0	182	299	313	327	164	313
7	42	42	28	0	0	0	182	299	313	327	327	299
8	42	49	28	0	0	0	182	285	313	327	327	285
9	42	57	28	0	0	0	91	299	313	327	327	285
10	42	57	28	0	85	0	0	299	313	327	327	285
11	42	57	85	91	170	0	0	299	313	0	327	285
12	42	57	158	182	85	0	14	299	313	123	327	285
13	42	57	152	91	0	0	92	299	313	299	327	285
14	42	57	79	0	0	0	182	299	313	327	327	272
15	42	118	0	0	0	0	88	299	313	327	327	259
16	42	194	19	0	0	0	22	313	313	327	327	259
17	42	97	19	0	0	0	22	313	313	327	327	246
18	42	28	0	0	0	49	57	156	313	327	341	233
19	42	57	0	0	0	158	140	150	327	327	327	233
20	42	57	0	0	0	158	182	299	327	327	327	233
21	107	57	0	0	0	79	188	313	327	327	327	233
22	194	61	0	0	0	0	188	313	327	327	327	233
23	65	65	0	0	0	0	188	299	327	327	313	233
24	21	65	0	0	24	0	220	299	327	327	313	233
25	42	65	0	0	24	0	220	299	327	327	313	116
26	42	65	0	0	0	0	220	299	327	327	313	0
27	42	59	0	0	182	0	220	299	327	327	313	83
28	42	53	0	0	182	24	220	299	327	327	313	42
29	42	49	0	0	.....	24	220	299	327	327	313	0
30	42	41	0	0	.....	0	233	299	327	327	313	0
31	42	.....	0	0	.....	0	.....	299	.....	327	313	.....

NOTE.—Discharge determined from a rating curve well defined above 30 second-feet.

Monthly discharge of Central Oregon canal near Bend, Oreg., for the year ending Sept. 30, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	194	18	47.9	2,950	A.
November	194	28	60.5	3,600	A.
December	158	0	25.4	1,560	B.
January	182	0	19.8	1,220	D.
February	182	0	26.9	1,490	D.
March	158	0	18.8	1,160	D.
April	233	0	123	7,320	B.
May	313	150	284	17,500	A.
June	327	299	317	18,900	A.
July	327	0	294	18,100	A.
August	341	164	318	19,600	A.
September	313	0	226	13,400	A.
The year	341	0	147	107,000	

NOTE.—Accuracy rating for January, February, and March, 1914, reduced because of uncertainty as to length of time that water was flowing in canal.

PILOT BUTTE CANAL NEAR BEND, OREG.

LOCATION.—In the NE. ¼ sec. 7, T. 18 S., R. 12 E., at a point in the canal directly opposite gaging station on Central Oregon canal, about 2 miles south of Bend and half a mile below the point where the waters are divided between this canal and the Central Oregon canal.

RECORDS AVAILABLE.—March 6, 1905, to September 30, 1914.

GAGE.—Vertical staff on right bank directly opposite the gage in flume of Central Oregon canal.

DISCHARGE MEASUREMENTS.—Made by wading, at the gage or from a highway bridge half a mile below the gage.

CHANNEL AND CONTROL.—Channel is gravel and sand. Control is partly solid rock and is practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.45 feet November 11–14 and April 3–4 (discharge, 119 second-feet); canal dry at various times.

WINTER FLOW.—Canal operated intermittently during winter to provide water for stock and domestic use. Discharge relation not affected by ice.

ACCURACY.—Results good.

Discharge measurements of Pilot Butte canal near Bend, Oreg., for the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 21	P. V. Hodges	1.52	23.0	July 17	W. A. Schell	1.70	33.4
June 5	Hodges and Schell	1.58	24.3	Aug. 22	James E. Stewart	1.76	37.2

Daily discharge, in second-feet, of Pilot Butte canal near Bend, Oreg., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	88	95	0	26	0	44	103	27	27	16	41	41
2	95	95	0	73	0	0	111	27	27	14	41	41
3	95	95	0	48	0	0	119	27	27	30	41	41
4	95	48	0	0	0	0	119	27	27	33	41	41
5	95	12	0	44	0	0	111	27	27	33	41	41
6	95	12	0	88	0	0	103	27	27	33	14	41
7	95	12	0	44	0	0	103	27	27	33	33	41
8	95	12	0	0	21	0	103	27	27	33	41	41
9	95	12	0	0	21	0	52	27	27	33	41	41
10	95	12	0	0	40	0	0	27	27	33	41	41
11	95	119	7	0	80	0	0	27	27	0	41	41
12	95	119	26	0	40	0	0	27	27	33	41	41
13	95	119	53	0	0	0	6	27	28	33	41	41
14	95	119	80	0	0	44	33	27	32	33	41	37
15	95	56	48	0	0	88	43	27	33	33	41	37
16	95	21	0	0	0	44	12	27	33	32	41	41
17	95	48	0	0	0	0	0	27	33	32	41	41
18	95	95	0	0	0	0	14	21	33	33	41	41
19	95	0	0	0	0	0	27	21	33	24	41	41
20	95	40	0	0	0	0	27	27	26	17	41	41
21	48	40	0	48	0	0	27	27	33	17	41	41
22	21	0	0	95	0	0	27	27	33	24	41	41
23	48	0	0	48	0	0	27	27	33	37	41	41
24	95	80	0	0	0	0	27	27	33	41	41	41
25	95	80	0	0	0	0	27	27	33	41	41	20
26	95	80	0	0	0	0	27	27	33	41	41	0
27	95	80	0	0	88	0	27	27	33	41	41	0
28	95	80	0	0	88	0	27	27	33	41	41	0
29	95	80	19	0	.....	0	27	27	33	41	41	0
30	95	40	19	0	.....	0	27	27	33	41	41	0
31	95	.....	0	0	.....	103	.....	27	.....	41	41	0

NOTE.—Discharge determined from two rating curves, one applicable Oct. 1, to Apr. 12, well defined above 25 second-feet, the other applicable Apr. 13 to Sept. 30, well defined above 15 second-feet.

Monthly discharge of Pilot Butte canal near Bend, Oreg., for the year ending Sept. 30, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	95	21	89.4	5,500	A.
November	119	0	56.7	3,370	B.
December	80	0	8.1	498	D
January	95	0	16.6	1,020	D.
February	88	0	13.5	750	D.
March	103	0	10.4	640	D.
April	119	0	45.2	2,690	B.
May	27	21	26.6	1,640	A.
June	33	27	30.2	1,800	A.
July	41	0	31.2	1,920	A.
August	41	14	39.9	2,450	A.
September	41	0	33.2	1,980	A.
The year	119	0	33.5	24,300	

NOTE.—Accuracy rating for December, 1913, January, February, and March, 1914, reduced because of uncertainty as to length of time water was flowing in the canal.

NORTH CANAL NEAR BEND, OREG.

LOCATION.—In the NE. ¼ sec. 29, T. 17 S., R. 12 E., about 500 feet below wagon bridge and about 1 mile north of Bend.

RECORDS AVAILABLE.—June 14, 1913, to September 30, 1914.

GAGE.—Painted on concrete flume on left side.

DISCHARGE MEASUREMENTS.—Made from plank across canal; stay wire used.

CHANNEL AND CONTROL.—Concrete-lined section extends about 1,000 feet below gage. Below that point canal is in rock cut and unlined; sides and bottom very rough. Changes in unlined section may affect discharge relation.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.85 feet August 7 to August 18 (discharge, 304 second-feet); canal dry at various times.

ACCURACY.—Results good.

Discharge measurements of North canal near Bend, Oreg., during the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 1	R. R. Randell	2.60	95.8	May 23	P. V. Hodges	4.90	249
Apr. 9	C. M. Redfield	1.00	27.5	26	Dubuis and Schell	5.20	267
13	do	2.60	101	26	do	4.52	216
13	do	3.20	136	27	W. A. Schell	4.00	177
13	do	4.25	220	27	do	2.82	106
14	do	3.00	123	June 4	P. V. Hodges	5.20	268
14	do	5.46	322	29	W. A. Schell	5.60	284
20	P. V. Hodges	2.70	107	July 13	P. V. Hodges	5.58	288
May 16	John Dubuis	4.70	237	Aug. 8	Redfield and Schell	5.85	301
16	C. M. Redfield	4.70	239	8	do	5.85	298
20	W. A. Schell	4.80	241				

Daily discharge, in second-feet, of North canal near Bend, Oreg., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Apr.	May.	June.	July.	Aug.	Sept.
1	142	91	.....	0	176	254	287	301	294
2	142	91	.....	0	189	254	287	301	294
3	142	91	.....	0	202	260	287	301	294
4	142	91	.....	0	202	260	287	301	294
5	142	91	.....	0	202	260	287	301	287
6	142	45	.....	0	208	260	287	301	280
7	142	.....	.....	11	215	260	287	301	273
8	142	.....	.....	22	208	260	287	301	267
9	142	.....	.....	11	221	260	287	301	260
10	142	.....	51	0	221	260	287	301	247
11	142	.....	51	88	221	260	287	301	247
12	142	.....	51	88	228	260	287	301	247
13	142	.....	51	44	228	260	287	301	234
14	142	.....	51	44	228	260	287	301	228
15	91	.....	.....	0	228	267	294	301	221
16	91	.....	.....	0	228	273	294	301	221
17	91	.....	.....	88	228	273	294	301	202
18	91	.....	.....	88	234	273	294	301	202
19	91	.....	.....	88	234	273	294	294	202
20	91	.....	.....	94	234	273	294	287	202
21	91	.....	.....	106	234	280	294	287	202
22	91	.....	.....	106	241	287	301	287	202
23	91	.....	.....	112	241	287	301	287	202
24	91	.....	.....	130	241	273	301	287	202
25	91	.....	.....	130	241	273	301	287	202
26	91	.....	.....	143	221	280	301	287	202
27	91	.....	.....	150	221	280	301	287	202
28	91	.....	.....	150	241	287	301	287	202
29	91	.....	.....	163	247	287	301	287	202
30	91	.....	.....	163	247	287	301	294	14
31	91	.....	.....	.....	247	.....	301	294	.....

NOTE.—Discharge determined from two well defined rating curves, one applicable Oct. 1 to Apr. 6; the other Apr. 7 to Sept. 30. No water flowing in canal on days for which record is not given.

Monthly discharge of North canal near Bend, Oreg., for the year ending Sept. 30, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	142	91	114	7,010	A.
November	91	0	16.7	994	B.
December	51	0	8.2	504	B.
January	0	0	0	0	
February	0	0	0	0	
March	0	0	0	0	
April	163	0	67.3	4,000	B.
May	247	176	224	13,800	A.
June	287	254	269	16,000	A.
July	301	287	293	18,000	A.
August	301	287	296	18,200	A.
September	294	14	228	13,600	B.
The year	300	0	127	92,100	

SWALLEY CANAL NEAR BEND, OREG.

LOCATION.—In NE. ¼ sec. 29, T. 17 S., R. 12 E., about 100 yards above road crossing, one-fourth mile below North canal dam, and about 1½ miles north of Bend.

RECORDS AVAILABLE.—July 5, 1913, to September 30, 1914.

GAGE.—Vertical staff on right bank.

DISCHARGE MEASUREMENTS.—Made from plank laid across flume.

CHANNEL AND CONTROL.—Wooden flume. Rating will be affected by any change in canal below, but it is practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.00 feet July 31 to August 6 and August 8–12 (discharge, 76 second-feet); ditch dry during most of April.

ACCURACY.—Results good.

Discharge measurements of Swalley canal near Bend, Oreg., during the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 1	R. R. Randell	[a] 1.50	39.5	Apr. 20	P. V. Hodges	0.25	[b] 1.0
Mar. 31	F. F. Henshaw	.16	[b] 5	June 4	do	1.85	67.1

[a] Observer's reading for the day. [b] Estimated.

Daily discharge, in second-feet, of Swalley canal near Bend, Oreg., for the year ending Sept. 30, 1913.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1	.....	48	43	11	38	53	38	21	43	43	48
2	.....	48	43	12	38	48	38	22	43	43	48
3	.....	48	43	13	40	48	38	23	48	43	48
4	.....	53	43	14	43	48	38	24	53	43	48
5	53	53	38	15	58	48	38	25	53	43	48
6	14	53	38	16	58	48	38	26	53	43	48
7	53	53	38	17	53	48	38	27	53	43	48
8	43	53	38	18	53	48	38	28	53	43	48
9	38	53	38	19	53	48	38	29	58	43	48
10	43	53	38	20	43	43	38	30	53	43	48
								31	48	43	.....

Daily discharge, in second-feet, of Swalley canal near Bend, Oreg., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	48	48	43	14	14	28	0.0	33	46	53	76	58
2	48	48	43	14	14	28	0	33	54	53	76	58
3	48	48	43	14	14	28	0	33	64	53	76	58
4	48	48	43	14	14	28	7.5	33	64	53	76	58
5	48	48	43	14	14	28	7.5	43	64	53	76	58
6	48	48	43	14	14	28	0	43	64	53	76	58
7	48	48	43	14	14	28	0	43	64	43	19	58
8	48	48	43	14	14	28	0	43	64	43	76	58
9	48	43	43	14	14	26	0	43	64	43	76	58
10	48	43	43	14	14	26	0	43	64	43	76	58
11	48	43	43	14	14	26	0	33	64	43	76	58
12	48	43	43	14	14	26	28	33	64	43	76	58
13	48	43	43	14	14	26	0	33	64	56	67	58
14	48	43	43	14	14	26	0	33	64	56	58	58
15	43	43	14	14	14	26	0	33	53	56	58	58
16	43	43	14	14	14	26	0	46	53	57	58	58
17	43	43	14	14	14	28	0	58	53	58	58	58
18	43	43	14	14	14	28	0	58	53	58	58	50
19	48	43	14	14	14	28	6.2	58	53	58	58	43
20	48	43	14	14	14	28	0	56	58	58	58	43
21	43	43	14	14	14	28	0	56	53	58	58	43
22	43	43	14	14	14	28	0	58	53	58	58	43
23	43	43	14	14	14	28	0	61	53	59	58	43
24	43	43	14	14	14	28	0	17	53	64	58	43
25	43	43	14	14	14	28	0	16	53	67	58	43
26	43	43	14	14	14	28	33	58	53	67	58	43
27	48	43	14	14	14	28	0	58	53	70	58	43
28	48	43	14	14	20	28	0	46	53	70	58	43
29	48	43	14	14	.....	28	0	46	53	70	58	43
30	48	43	14	14	.....	28	0	46	53	70	58	43
31	48	.....	14	14	.....	0	.....	46	.....	76	58	.....

NOTE.—Discharge determined from a rating curve well defined up to 80 second-feet. Record for April is doubtful, as the canal was being repaired and water was turned in occasionally, but the length of time the gates were open is not known.

Monthly discharge of Swalley canal near Bend, Oreg., for the period July 5 to Sept. 30, 1913, and the year ending Sept. 30, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
1913.					
July 5-31	58	38	47.4	2,540	B.
August	53	43	47.4	2,910	B
September	48	38	42.0	2,500	B.
The period				7,950	
1914.					
October	48	43	46.4	2,850	B.
November	48	43	44.3	2,640	B.
December	43	14	27.1	1,670	B.
January	14	14	14.0	861	B.
February	20	14	14.2	789	B.
March	28	0	26.6	1,640	B.
April	33	0	2.74	163	D.
May	61	16	43.2	2,660	A.
June	64	46	57.4	3,420	A.
July	76	43	56.8	3,490	A.
August	76	19	63.4	3,900	A.
September	58	43	51.7	3,080	A.
The year	76	0	37.5	27,200	

TUMALO CREEK NEAR TUMALO,[1] OREG.

LOCATION.—In sec. 3, T. 18 S., R. 10 E., 300 feet above intake of Wimer[2] canal, 15 miles from Tumalo.

DRAINAGE AREA.—48 square miles.

RECORDS AVAILABLE.—May 15, 1906, to May 17, 1914, when station was discontinued; irrigation seasons only; records during winter kept at lower station near Bend.

GAGE.—Vertical staff; present gage installed April 20, 1910. In 1906 and 1907 gage was in sec. 2, half a mile above head gate of Columbia Southern canal and below Wimer canal.

DISCHARGE MEASUREMENTS.—Made from a footlog or by wading.

CHANNEL AND CONTROL.—Gravel and large rocks; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded October 1 to May 17, 4.25 feet at 1 p. m. May 14 (discharge, 258 second-feet); minimum stage recorded, 3.45 feet February 4–17 (discharge, 67 second-feet). These figures do not represent the extremes for year. See records on Tumalo Creek near Bend, where discharge is only slightly greater.

WINTER FLOW.—Practically no winter records.

DIVERSIONS.—Present station is above all diversions; earlier station was below intake of Wimer canal, discharge of which has been added to give the total for the creek.

ACCURACY.—Results excellent.

Discharge measurements of Tumalo Creek near Tumalo, Oreg., during the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 31	R. R. Randell	3.56	84.1
Apr. 4	F. F. Henshaw	3.64	104

[1] Formerly Laidlaw.
[2] Erroneously stated as above Columbia Southern canal in Water-Supply Papers 332 and 362.

Daily discharge, in second-feet, of Tumalo Creek near Tumalo, Oreg., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.
1	79	89	84	74	74	74	74	140
2	79	84	84	74	70	74	93	165
3	79	84	84	74	70	74	104	178
4	79	84	84	74	67	74	102	170
5	79	93	84	74	67	74	108	165
6	88	104	84	74	67	74	104	178
7	154	135	84	74	67	74	104	191
8	93	115	84	74	67	74	120	217
9	89	115	84	74	67	74	122	191
10	84	104	84	74	67	74	130	178
11	84	104	84	74	67	74	138	191
12	84	89	84	74	67	74	146	217
13	84	89	84	74	67	74	155	222
14	89	89	74	74	67	84	128	258
15	89	89	74	74	67	84	191	249
16	89	89	74	74	67	84	165	247
17	84	89	74	74	67	93	158	247
18	84	84	74	84	70	93	165	.....
19	84	84	74	84	70	93	191	.....
20	84	84	74	84	70	93	191	.....
21	84	84	74	84	70	104	162	.....
22	84	84	74	84	74	104	162	.....
23	84	84	74	84	74	104	150	.....
24	84	84	74	84	74	104	140	.....
25	84	84	74	84	74	104	140	.....
26	84	84	74	84	74	104	138	.....
27	84	84	74	74	74	104	135	.....
28	84	84	74	74	74	104	130	.....
29	84	84	74	74	.....	104	122	.....
30	84	84	74	74	.....	104	115	.....
31	89	.....	74	74	.....	104	.....	.....

NOTE.—Discharge determined from a well-defined rating curve. Discharge interpolated for lack of gage readings, Apr. 10–12, 26, and May 6.

Monthly discharge of Tumalo Creek near Tumalo, Oreg., for the year ending Sept. 30, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	154	79	86.7	5,330	A.
November	135	84	91.2	5,430	A.
December	84	74	78.2	4,810	A.
January	84	74	76.9	4,730	A.
February	74	67	69.6	3,870	A.
March	104	74	88.1	5,420	A.
April	191	74	136	8,090	A.
May 1–17	258	140	200	6,740	A.
The period	.....	.....	.....	44,400	

TUMALO CREEK NEAR BEND, OREG.

LOCATION.—In the SE. ¼ sec. 23, T. 17 S., R. 11 E., one-fourth mile above the diversion dam of the feed canal of the Tumalo project, half a mile below highway bridge on Bend-Sisters road, 4 miles above mouth, and 4 miles northwest of Bend.

DRAINAGE AREA.—57 square miles.

RECORDS AVAILABLE.—October 6, 1906, to September 30, 1914 (fragmentary). Until May, 1914, this station was maintained in winter months only to insure a year-long record on the stream. The upper station is somewhat isolated and sometimes inaccessible in winter.

GAGE.—Vertical staff nailed to overhanging stump, since November, 1910; previous records at different site.

DISCHARGE MEASUREMENTS.—At ordinary stages made by wading near the gage; at flood stages, from a large tree fallen across stream about 200 yards below gage.

CHANNEL AND CONTROL.—Rocks and gravel; not liable to shift greatly.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.70 feet at 5 p. m. April 15 (discharge, 415 second-feet; total, including diversions, 461 second-feet); minimum stage recorded, 0.50 foot at 9 a. m. November 20 (discharge, 4 second-feet; total, including diversions, 55 second-feet). This minimum is very uncertain and is not confirmed by records at the station above the Wimer canal. A more probable minimum for the year, including diversions, is 60 second feet, September 13.

WINTER FLOW.—Discharge relation considerably affected by ice during extremely cold weather.

ACCURACY.—Results good.

Discharge measurements of Tumalo Creek near Bend, Oreg., for the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 1	R. R. Randell	0.63	6.4	June 4	P. V. Hodges	2.05	206
Apr. 10	P. V. Hodges	1.32	76.7	July 13	do	1.52	98.9
May 23	do	2.28	273	17	do	1.42	82.9

Daily discharge, in second-feet, of Tumalo Creek near Bend, Oreg., for the year ending Sept. 30, 1914.

Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	7	46	45	52	46	58	77	298	161	78	62
2	10	.....	46	58	49	62	90	343	183	75	64
3	13	.....	46	58	52	65	100	244	218	72	62
4	16	.....	46	.....	52	72	90	194	150	68	62
5	19	.....	46	.....	52	72	71	150	130	65	62
6	22	.....	46	.....	49	72	83	150	130	65	62
7	25	.....	46	.....	46	72	95	130	130	65	64
8	19	.....	46	.....	52	72	112	112	121	62	62
9	13	.....	46	.....	58	74	91	108	112	65	62
10	10	.....	42	58	62	75	76	112	112	68	62
11	8	.....	38	58	65	74	84	130	112	72	62
12	6	.....	35	54	62	72	105	130	112	72	61
13	6	35	38	50	58	106	98	130	112	75	59
14	6	.....	40	46	58	124	139	140	103	75	70
15	6	.....	43	46	58	415	125	172	94	78	72
16	20	.....	46	46	58	94	137	206	88	75	81
17	35	.....	43	46	62	94	202	218	88	72	96
18	40	.....	40	46	65	94	187	231	89	70	94
19	22	.....	42	46	68	103	172	218	94	68	88
20	4	.....	44	46	72	112	165	183	103	67	84
21	31	.....	46	46	72	116	176	140	84	65	80
22	58	.....	42	46	72	121	194	130	72	65	78
23	58	.....	38	46	80	118	298	130	75	65	68
24	58	.....	35	46	76	115	292	172	75	65	62
25	58	.....	40	46	72	112	239	140	75	64	62
26	58	.....	46	46	72	89	213	140	78	64	78
27	58	.....	46	46	72	87	194	150	80	65	75
28	58	.....	46	46	72	77	172	150	78	65	62
29	58	.....	46	.....	72	69	172	172	78	65	62
30	58	.....	46	.....	65	52	194	161	76	65	59
31	.....	.....	46	.....	62	.....	206	.....	76	62	.....

NOTE.—Discharge Nov. 1 to Apr. 25 based on about three gage readings a week; discharge interpolated for days for which gage-height was not recorded except for periods for which it has been estimated on account of ice, as follows: Dec. 2–12 and 14–31, 40 second-feet; Jan. 1, 45 second-feet; Feb. 4–9, 55 second-feet; Apr. 26 to May 18 discharge obtained by subtracting the flow of Wimer and Columbia Southern canals from the discharge of Tumalo Creek near Laidlaw. Discharge interpolated for lack of gage readings, July 6 and 8.

Monthly discharge of Tumalo Creek near Bend, Oreg., for the year ending Sept. 30, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	.....	.....	a7.0	430	D.
November	58	4	28.7	1,710	B.
December	.....	.....	40.0	2,460	D.
January	46	35	43.3	2,660	B.
February	58	46	50.3	2,790	B.
March	80	46	62.3	3,830	B.
April	415	52	97.9	5,830	B.
May	298	71	150	9,220	B.
June	343	108	169	10,100	A.
July	218	72	106	6,520	A.
August	78	62	68.3	4,200	A.
September	96	59	69.2	4,120	A.
The year	415	.....	74.4	53,900	

a Estimated by subtracting flow of Wimer and Columbia Southern canals from discharge of Tumalo Creek near Laidlaw.

Combined monthly discharge of Tumalo Creek, Wimer canal, and Columbia Southern canal near Bend, Oreg., for the year ending Sept. 30, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	.....	.....	86.5	5,320	B.
November	127	.....	95.9	5,710	A.
December	.....	.....	83.5	5,130	C.
January	86	67	76.7	4,720	B.
February	92	80	85.1	4,730	B.
March	120	82	100	6,150	B.
April	461	90	145	8,630	B.
May	336	140	215	13,200	A.
June	361	122	183	10,900	A.
July	231	82	118	7,260	A.
August	88	63	71.3	4,380	A.
September	97	60	72.7	4,330	A.
The year	461	.....	111	80,500	

WIMER CANAL NEAR TUMALO, OREG.[1]

LOCATION.—In sec. 2, T. 18 S., R. 10 E., half a mile below the intake and below controlling spillway; about 15 miles southwest of Tumalo.

RECORDS AVAILABLE.—1906–1914; irrigation seasons only; records for 1906–1907 were obtained just below intake and above controlling spillway.

GAGE.—Vertical staff; no change in datum since April 1, 1908.

DISCHARGE MEASUREMENTS.—Made by wading or from yoke of flume.

CHANNEL AND CONTROL.—Flume.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.30 feet May 8, 13–15 (discharge, 21 second-feet); canal dry at various times.

WINTER FLOW.—Canal not operated during ice season.

ACCURACY.—Results fair.

Discharge measurements of Wimer canal near Tumalo, Oreg., for the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 31	R. R. Randell	0.68	6.2
Apr. 4	F. F. Henshaw	.47	3.5

[1] Formerly Laidlaw.

Daily discharge, in second-feet, of Wimer canal near Tumalo, Oreg., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Apr.	May.	Day.	Oct.	Nov.	Apr.	May.
1	18	7	0.0	10	16	10	12	3.7	18
2	18	7	2.6	13	17	0	12	7	16
3	18	7	2.6	16	18	0	11	8	13
4	18	7	3.4	16	19	0	11	9	14
5	18	11	3.4	18	20	0	11	9	14
6	20	13	3.3	18	21	0	11	9	14
7	8	15	3.3	18	22	0	11	9	14
8	16	15	3.7	21	23	9	10	9	18
9	10	15	4.0	18	24	9	10	9	18
10	10	15	3.8	19	25	9	10	9	14
11	10	15	3.7	19	26	9	10	9	14
12	10	13	3.6	20	27	9	10	9	14
13	10	12	3.4	21	28	9	10	9	14
14	10	12	3.4	21	29	9	10	9	14
15	10	12	3.7	21	30	8	0	10	14
					31	7	.....	.....	14

NOTE.—Canal dry Dec. 1 to Mar. 31 and Sept. 22-30. Discharge interpolated for lack of gage readings, Apr. 10-12, 21, 22, and 26; May 6 and 17. Discharge estimated, for lack of gage readings, from ditch walker's report at 14 second-feet, May 19-23 and May 25 to June 11. From June 12 to Sept. 21 gage was visited only when head gates were changed. Flow reported constant between visits and discharge estimated as follows: June 12 to July 17, 13 second-feet; July 18 to Aug. 6, 10 second-feet; Aug. 7 to Sept. 21, 1.3 second-feet.

Monthly discharge of Wimer canal near Tumalo, Oreg., for the year ending Sept. 30, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	20	0	9.42	579	B.
November	15	0	10.8	643	B.
December	.....	.....	0	0	
January	.....	.....	0	0	
February	.....	.....	0	0	
March	.....	.....	0	0	
April	10	0	5.85	348	B.
May	21	10	16.3	1,000	B.
June	.....	.....	13.6	809	C.
July	.....	.....	11.6	713	C.
August	.....	.....	2.98	183	D.
September	.....	.....	.91	54	
The year	.....	0	6.0	4,330	

COLUMBIA SOUTHERN CANAL NEAR TUMALO,[1] OREG.

LOCATION.—In sec. 2, T. 18 S., R. 10 E., one-fourth mile below head gates, and about 15 miles southwest of Tumalo.

RECORDS AVAILABLE.—Irrigation seasons 1906–1913. Station discontinued May 23, 1914; canal being replaced by Tumalo feed canal.

GAGE.—Vertical staff on upstream side of wasteway.

DISCHARGE MEASUREMENTS.—Made by wading, or from a footlog near gage.

CHANNEL AND CONTROL.—Flume.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.10 feet May 13 and 15 (discharge, 103 second-feet); canal dry May 24 to September 22.

WINTER FLOW.—Canal not operated during ice season.

ACCURACY.—Results good.

[1] Formerly Laidlaw.

Discharge measurements of Columbia Southern canal near Tumalo, Oreg., during the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.
Oct. 31	R. R. Randell	1.81	72.0
Apr. 4	F. F. Henshaw	1.50	43.6

Daily discharge, in second-feet, of Columbia Southern canal near Tumalo, Oreg., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.
1	58	84	36	32	32	36	32	53
2	58	82	36	32	34	36	36	62
3	58	92	48	32	34	36	45	62
4	58	82	48	32	34	36	40	64
5	58	92	48	32	34	36	40	76
6	60	87	48	32	34	36	40	77
7	92	87	48	32	34	40	40	78
8	72	82	48	32	34	40	42	84
9	67	84	48	32	34	40	42	82
10	67	84	48	32	34	40	42	83
11	67	84	48	32	34	40	43	88
12	67	77	48	32	34	40	44	92
13	67	77	48	32	34	40	44	103
14	70	77	46	32	34	40	42	98
15	70	40	46	36	34	40	42	103
16	70	40	44	36	35	36	40	92
17	77	40	44	36	35	36	40	29
18	77	40	44	40	35	36	40	29
19	77	40	44	40	36	36	42	29
20	77	40	44	40	36	36	42	29
21	77	29	44	40	36	36	40	29
22	77	29	44	32	36	40	38	29
23	72	29	42	32	36	40	36	29
24	72	29	40	32	36	40	40	0
25	72	29	40	32	36	40	40	0
26	72	29	40	32	36	40	40	0
27	72	29	40	32	36	40	39	0
28	72	29	40	32	36	38	44	0
29	72	29	40	32	.....	36	44	0
30	72	29	29	32	.....	34	53	0
31	74	.....	36	32	.....	32	.....	0

NOTE.—Discharge determined from a well-defined rating curve. Discharge interpolated for lack of gage readings, Mar. 28–31, Apr. 10–12, 21, 22, 26, and May 6. Discharge estimated for lack of gage readings May 17–22. Canal dry May 24 to Sept. 22; discharge 10 second-feet Sept. 23. Discharge estimated Sept. 24–30 at 10 second-feet.

Monthly discharge of Columbia Southern canal near Tumalo, Oreg., for the year ending Sept. 30, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	92	58	70.0	4,300	A.
November	92	29	56.4	3,360	A.
December	48	29	43.5	2,670	A.
January	40	32	33.4	2,050	A.
February	36	32	34.8	1,930	A.
March	40	32	37.8	2,320	A.
April	53	32	41.1	2,450	A.
May	103	0	48.4	2,980	B.
June	0	0	0	0	
July	0	0	0	0	
August	0	0	0	0	
September	10	0	2.6	155	D.
The year	103	0	30.5	22,200	

TUMALO FEED CANAL NEAR BEND, OREG.

LOCATION.—In the SE. ¼ sec. 23, T. 17 S., R. 11 E., in concrete-lined section, about 300 feet below diversion dam, half a mile below bridge across Tumalo Creek on road from Bend to Sisters, 4 miles from Bend.

RECORDS AVAILABLE.—May 21, 1914, when water was first diverted, to September 30, 1914.

GAGE.—Painted on concrete lining.

DISCHARGE MEASUREMENTS.—Made from a footbridge at gage.

CHANNEL AND CONTROL.—Trapezoidal concrete section; control is the sand trap just above the intake to a steel flume.

EXTREMES OF STAGE.—Maximum stage recorded May 21 to September 30, 3.15 feet July 2 and 3; minimum stage recorded, 0.70 foot May 21.

WINTER FLOW.—Water has to be turned out in freezing weather.

ACCURACY.—Results are good..

Estimates withheld for additional data.

The following measurement was made by Hodges and Henshaw in Tumalo Creek above the diversion dam (the estimated leakage through the dam was deducted):

July 17, gage height, 2.55 feet; discharge, 82.1 second-feet.

Daily discharge, in second-feet, of Tumalo feed canal at intake, near Bend, Oreg., for the year ending Sept. 30, 1914.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1		74	124	68	60	16		88	82	68	46
2		78	125	66	60	17		101	88	65	53
3		83	125	64	60	18		101	83	62	60
4		83	120	62	59	19		92	88	62	52
5		83	120	59	59	20		101	96	62	53
6		83	115	60	59	21		101	78	60	59
7		83	110	60	60	22	0	106	69	62	59
8		83	108	58	59	23	0	110	70	61	58
9		90	106	59	58	24	35	96	68	61	55
10		91	103	60	58	25	52	101	69	60	56
11		96	103	65	58	26	66	110	70	60	58
12		80	105	63	58	27	66	110	71	61	56
13		92	104	65	58	28	56	110	70	60	53
14		91	96	66	62	29	70	110	69	60	52
15		83	94	68	47	30	70	118	68	60	52
						31	70		68	60	

NOTE.—Daily discharge determined from a well-defined rating curve.

Monthly discharge of Tumalo feed canal at intake, near Bend, Oreg., for the year ending Sept. 30, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
May 24-31	70	35	60.6	961	B.
June	118	74	94.3	5,610	A.
July	125	68	92.4	5,680	A.
August	68	59	62.2	3,820	A.
September	62	46	56.6	3,370	B.
The period				19,400	

SQUAW CREEK NEAR SISTERS, OREG.

LOCATON.—In the NW. ¼ sec. 31, T. 15 S., R. 10 E., about 4 miles above Sisters and above all diversions.

DRAINAGE AREA.—63 square miles.

RECORDS AVAILABLE.—May 30 to December 31, 1913, and April 7 to September 13, 1914, when station was discontinued; July 1, 1906, to May 29, 1913, in sec. 30, at station below the intake of McAllister's ditch, about 700 feet farther downstream.

GAGE.—Vertical staff.

DISCHARGE MEASUREMENTS.—Made from a foot log below intake of McAllister's ditch and the flow of the ditch added, or by wading.

CHANNEL.—Gravel and rock; practically permanent.

EXTREMES OF STAGE.—Maximum stage recorded, 2.75 feet June 18 and July 7 (discharge, 288 second-feet, but may have been greater during night); minimum stage recorded, 1.80 feet September 13 (discharge, 47 second-feet.) This was probably not the minimum for the year.

DIVERSIONS.—No diversions above the station. Low-water flow entirely diverted below the station.

COOPERATION.—Gage-height record beginning April 7 furnished by the water master of Crook County.

ACCURACY.—Results are good. Estimates during high water may be somewhat in error on account of fluctuations due to melting snow.

The following measurement was made by P. V. Hodges:
April 11, gage height, 1.98 feet; discharge, 75 second-feet.

Daily discharge, in second feet, of Squaw Creek near Sisters, Oreg., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Apr.	May.	June.	July.	Aug.	Sept.
1	80	62	59	.....	90	270	235	155	100
2	80	62	59	.....	100	270	205	160	.....
3	71	62	54	.....	106	277	213	165	.....
4	66	62	50	.....	112	211	221	170	.....
5	62	80	50	.....	112	175	229	175	.....
6	66	96	50	.....	120	150	258	205	.....
7	270	90	50	75	125	140	288	205	.....
8	150	100	50	80	125	130	235	175	.....
9	80	100	50	90	138	112	252	150	.....
10	100	80	50	80	138	112	252	150	75
11	80	76	50	80	138	112	252	150	.....
12	80	71	50	80	142	125	224	150	.....
13	90	71	50	112	150	145	196	175	47
14	80	66	50	131	190	158	168	175	.....
15	76	66	50	150	199	170	159	175	.....
16	71	66	.....	125	190	205	150	150	.....
17	71	66	.....	112	190	252	185	125	.....
18	71	66	.....	112	190	288	220	.....	.....
19	71	66	.....	109	175	263	225	.....	.....
20	71	62	.....	106	181	212	230	.....	.....
21	76	62	.....	102	199	162	235	.....	.....
22	76	62	.....	99	235	162	270	.....	.....
23	71	62	.....	96	270	162	270	.....	.....
24	71	66	.....	93	238	252	252	.....	.....
25	66	66	.....	90	205	205	220	.....	.....
26	66	66	.....	90	181	190	175	.....	.....
27	66	62	.....	90	184	175	175	.....	.....
28	66	62	.....	90	162	193	175	.....	.....
29	62	62	.....	80	162	211	168	.....	.....
30	62	62	.....	80	175	220	175	.....	.....
31	66	.....	.....	.....	222	.....	150	.....	.....

NOTE.—Daily discharge determined from a well-defined rating curve. Discharge interpolated on account of ice obstruction Dec. 7–11, and on account of lack of gage eadings Dec. 13–14, Apr. 19–25, July 3–4, 12–13, 19–20, Aug. 1–4, and for single days at other times.

Monthly discharge of Squaw Creek near Sisters, Oreg., for the year ending Sept. 30, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	270	62	81.7	5,020	B.
November	100	62	70.1	4,170	B.
December 1–15	59	50	51.5	1,530	B.
April 7–30	150	75	98.0	4,670	B.
May	270	90	166	10,200	B.
June	288	112	190	11,300	B.
July	288	150	215	13,200	B.
August 1–17	205	125	165	5,560	B.

CROOKED RIVER AT HOFFMAN'S RANCH, NEAR PRINEVILLE, OREG.

LOCATION.—In the NW. ¼ sec. 20, T. 16 S., R. 16 E., one-fourth mile above Hoffman's ranch house and 10 miles south of Prineville.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January 24, 1913, to September 30, 1914, when station was discontinued.

GAGE.—Vertical staff.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Sand; probably shifting; two channels at high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.8 feet at 1 p. m. April 5 (discharge, 3,500 second-feet); minimum stage recorded, 1.45 feet August 25–28 (discharge, 3.5 second-feet).

WINTER FLOW.—No record during winter period of 1914.

DIVERSIONS.—Amount of diversion unknown.

ACCURACY.—Results fair.

Discharge measurements of Crooked River at Hoffman's ranch, near Prineville, Oreg., during the period Oct. 1, 1913, to Oct. 24, 1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 28	P. V. Hodges	4.50	1,060	June 8	P. V. Hodges	2.99	162
Apr. 16[a]	do	5.35	2,540	Oct. 24	James E. Stewart	2.48	63.4
18	do	4.70	1,420				

[a] Measured at Prineville; observer's gage reading made just previous to measurement.

Daily discharge, in second-feet, of Crooked River at Hoffman's ranch, near Prineville, Oreg., for the years ending Sept. 30, 1913–14.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1913.									
1	.....	117	126	1,870	792	168	.....	35	20
2	.....	100	137	2,140	750	132	.....	35	18
3	.....	100	147	1,450	712	122	.....	31	18
4	.....	100	1,450	1,370	675	112	.....	35	18
5	.....	137	1,040	1,370	802	87	.....	35	18
6	.....	100	935	1,370	930	82	.....	35	18
7	.....	117	702	1,160	930	76	.....	35	18
8	.....	137	578	1,300	930	71	.....	33	18
9	.....	162	772	1,450	985	66	.....	31	18
10	.....	117	850	2,140	1,040	60	.....	29	18
11	.....	238	772	3,380	930	55	.....	27	18
12	.....	360	639	3,870	835	49	.....	24	17
13	.....	84	519	4,400	750	44	.....	65	16
14	.....	117	491	3,460	640	.....	.....	43	16
15	.....	169	463	2,530	563	.....	.....	35	14
16	.....	578	419	2,340	486	.....	.....	30	13
17	.....	608	419	2,140	514	.....	.....	26	13
18	.....	578	463	2,340	458	.....	.....	21	13
19	.....	180	1,040	2,530	425	.....	.....	21	13
20	.....	398	639	2,530	392	.....	.....	21	13
21	.....	164	551	2,340	360	.....	.....	21	18
22	.....	137	463	2,140	327	.....	.....	20	24
23	.....	147	448	1,620	294	.....	.....	20	27
24	100	117	434	1,450	294	.....	.....	16	24
25	103	127	419	1,620	294	.....	.....	12	26
26	137	137	419	1,780	274	.....	.....	178	27
27	137	126	419	1,620	256	.....	.....	78	29
28	159	117	419	1,450	238	.....	87	35	31
29	137	.....	419	1,040	238	.....	54	31	39
30	117	.....	1,220	835	238	.....	43	24	41
31	117	.....	1,780	.....	203	.....	39	22	.....

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1913–14.										
1	43	65	95	.....	710	458	458	66	12	4
2	43	72	90	.....	750	432	120	53	9	4
3	43	72	84	.....	1,530	458	197	42	9	4
4	43	72	78	.....	2,050	486	215	167	9	4
5	43	72	.....	.....	3,270	458	142	42	9	6
6	43	78	.....	.....	3,270	406	142	33	9	6
7	43	153	.....	.....	2,630	358	142	33	9	6
8	65	142	.....	.....	2,430	366	167	53	12	6
9	72	126	.....	.....	2,240	374	232	42	12	7.5
10	78	110	.....	.....	2,240	382	142	42	12	7.5
11	72	93	.....	.....	2,240	336	120	33	10.5	7.5
12	65	102	.....	.....	1,970	314	100	33	10.5	7.5
13	59	102	.....	.....	1,700	272	110	33	10.5	10.5
14	65	120	.....	.....	1,870	252	110	33	9	13.5
15	65	114	.....	.....	2,200	252	96	33	10.5	19.8
16	65	108	.....	.....	2,530	486	82	33	8.2	26
17	65	102	.....	.....	1,700	336	66	33	6	33
18	65	93	.....	2,630	1,370	275	48	33	5	33
19	65	.....	.....	2,630	1,220	214	42	30	4	42
20	65	.....	.....	2,630	1,450	182	33	26	4	48
21	65	.....	.....	2,530	1,300	167	30	26	4	48
22	65	.....	.....	2,430	1,070	514	26	26	4	45
23	65	.....	.....	2,430	835	214	33	26	4	42
24	65	.....	.....	2,340	835	336	32	26	4	40
25	65	.....	.....	1,700	750	272	30	26	3.5	38
26	65	.....	.....	1,450	695	336	27	20	3.5	36
27	65	.....	.....	1,240	640	266	314	15	3.5	33
28	65	110	.....	1,040	592	197	217	12	3.5	33
29	65	105	.....	880	544	167	120	12	4	33
30	65	100	.....	835	486	142	91	9	4	33
31	65	.....	.....	772	.....	120	.....	9	4	.....

NOTE.—Discharge determined from a fairly well defined rating curve, Jan. 24 to Apr. 12, 1913, and from two well-defined rating curves applicable Apr. 13, 1913, to Apr. 5, 1914, and Apr. 6 to Sept. 30, 1914. Discharge estimated, for lack of gage readings, from a study of adjacent streams Jan. 1–23, 1913, 100 second-feet; June 14–30, 1913, 50 second-feet; July 1–27, 1913, 40 second-feet; Nov. 19–28, 1913, 102 second-feet; Dec. 5–31, 1913, 80 second-feet; Jan. 1–10, 1914, 250 second-feet. Daily gage height record Jan. 24, 1913, to Sept. 30, 1914, somewhat fragmentary. All gaps in daily discharge, except for estimated periods, have been filled by interpolation.

Monthly discharge of Crooked River at Hoffman's ranch, near Prineville, Oreg., for the years ending Sept. 30, 1913 and 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
1912–13.					
October	72	15	49.1	3,020	A.
November	103	63	85.5	5,090	A.
December	242	82	124	7,620	B.
January	.....	.....	107	6,580	C.
February	608	84	199	11,100	B.
March	1,780	126	632	38,900	B.
April	4,400	835	2,030	121,000	B.
May	1,040	203	566	34,800	B.
June	168	.....	65.8	3,920	C.
July	.....	.....	42.0	2,580	C.
August	178	12	35.6	2,190	B.
September	41	13	20.5	1,220	B.
The year	4,400	.....	329	238,000	
1913–14.					
October	78	43	60.7	3,730	B.
November	153	65	101	6,010	B.
December	.....	.....	80.9	4,970	C.
January	.....	.....	227	14,000	C.
February	.....	.....	438	24,300	B.
March	2,630	.....	1,740	107,000	B.
April	3,270	486	1,570	93,400	A.
May	514	120	317	19,500	A.
June	458	26	123	7,320	A.
July	167	9	35.5	2,180	B.
August	12	3.5	7.17	441	C.
September	48	4.0	22.6	1,340	B.
The year	3,270	3.5	393	284,000	

NOTE.—Discharge October to December, 1913, obtained from the station at Stearn's ranch, where the discharge is practically the same as at Hoffman's; for Jan. 11 to Mar. 17, 1914, discharge the sum of discharge of Crooked River and Prineville flouring mills tailrace at Prineville.

CROOKED RIVER AT PRINEVILLE, OREG.

LOCATION.—In the NW. ¼ sec. 6, T. 15 S., R. 16 E.; at highway bridge just west of Prineville on road to Redmond.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January 11 to April 17, 1914, when station was discontinued.

GAGE.—Vertical staff on bridge abutment.

DISCHARGE MEASUREMENTS.—Made from lower side of highway bridge, or by wading at low water.

CHANNEL AND CONTROL.—Gravel and silt; may shift.

EXTREMES OF DISCHARGE.—Maximum stage recorded January 11 to April 17, 6.36 feet at 4 p. m. April 5 (discharge, 3,190 second-feet), minimum stage recorded, 1.72 feet at 8 a. m. February 2 (discharge, 50 second-feet; not the minimum for year).

DIVERSIONS.—Much water is diverted for irrigation above the station but only a little between it and the station at Hoffman's ranch. The power canal of the Prineville flour mill diverts around the station; also Peoples ditch, which irrigates along left bank of river; the latter did not carry much water during period of record.

ACCURACY.—Results good.

Discharge measurements of Crooked River at Prineville, Oreg., for the period Oct. 1, 1913, to Oct. 23, 1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 27	P. V. Hodges	4.05	1,100	June 8	P. V. Hodges	2.15	107
Apr. 16	do	5.65	2,470	Oct. 23	James E. Stewart	1.31	20.4

Daily discharge, in second-feet, of Crooked River at Prineville, Oreg., for the period Jan. 11 to Apr. 17, 1914.

Day.	Jan.	Feb.	Mar.	Apr.	Day.	Jan.	Feb.	Mar.	Apr.
1		120	1,600	610	16	180	150	2,330	2,430
2		50	1,520	610	17	180	97	2,430	1,770
3		114	1,060	1,440	18	165	87	2,530	
4		132	790	1,950	19	215	278	2,630	
5		153	990	3,230	20	165	550	2,630	
6		141	1,360	3,130	21	165	990	2,430	
7		144	1,520	2,530	22	165	1,280	2,430	
8		147	1,950	2,430	23	198	1,130	2,430	
9		150	1,770	2,430	24	300	500	1,680	
10		150	1,770	2,040	25	278	760	1,520	
11	235	150	1,770	2,230	26	255	1,060	1,200	
12	215	150	1,950	2,430	27	255	1,130	1,130	
13	180	150	1,770	2,430	28	255	1,440	955	
14	198	126	1,770	2,130	29	116		790	
15	180	150	2,130	2,040	30	144		700	
					31	180		670	

NOTE.—Discharge determined from a fairly well defined rating curve.

Monthly discharge of Crooked River at Prineville, Oreg., for the period Jan. 11 to Apr. 17, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January 11-31	300	116	201	8,380	B.
February	1,440	50	410	22,800	B.
March	2,630	670	1,680	103,000	B.
April 1-17	3,230	610	2,110	71,100	B.
The period				205,000	

PRINEVILLE FLOUR-MILL TAILRACE AT PRINEVILLE, OREG.

LOCATION.—In the NE. ¼ sec. 6, T. 15 S., R. 16 E., at highway bridge just at the west edge of Prineville, on road to Redmond, 100 yards below the Prineville flour mill.

RECORDS AVAILABLE.—January 11 to April 17, 1914, when station was discontinued.

GAGE.—Vertical staff nailed to sill of bridge bent.

DISCHARGE MEASUREMENTS.—Made from footbridge below wagon bridge.

CHANNEL AND CONTROL.—An old slough of Crooked River; probably will not shift.

EXTREMES OF DISCHARGE.—Maximum stage recorded January 11 to April 17, 2.75 feet at 8 a. m. March 17 (discharge, 84 second-feet); minimum stage, 0.80 foot at 11 a. m. January 17 (discharge, 8 second-feet).

ACCURACY.—Results good.

Discharge measurements of Prineville flour-mill tailrace at Prineville, Oreg., for the period Mar. 26 to Oct. 25, 1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 26	P. V. Hodges	1.90	42.5	June 7	P. V. Hodges	0.78	7.7
Apr. 17	do	2.05	48.2	Oct. 25	James E. Stewart	.93	46.9

Daily discharge, in second-feet, of Prineville flour-mill tailrace at Prineville, Oreg., for the period Jan. 11 to Apr. 17, 1914.

Day.	Jan.	Feb.	Mar.	Apr.	Day.	Jan.	Feb.	Mar.	Apr.
1	.....	12	54	20	16	11	24	81	42
2	.....	9	58	19	17	8	25	84	48
3	.....	14	46	56	18	10	23	74	.....
4	.....	15	40	61	19	11	30	81	.....
5	.....	26	46	61	20	11	34	64	.....
6	.....	23	54	51	21	12	42	66	.....
7	.....	22	61	48	22	12	54	64	.....
8	.....	22	71	44	23	13	48	56	.....
9	.....	19	78	40	24	28	34	56	.....
10	.....	21	24	38	25	22	38	54	.....
11	15	24	26	38	26	21	46	51	.....
12	9	26	74	38	27	21	48	42	.....
13	12	24	78	38	28	26	44	42	.....
14	12	18	76	36	29	15	.....	36	.....
15	10	22	78	36	30	20	.....	32	.....
					31	14	.....	28	.....

NOTE.—Discharge determine from a fairly well defined rating curve.

Monthly discharge of Prineville flour-mill tailrace at Prineville, Oreg., for the period Jan. 11 to Apr. 17, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January 11-31	28	8	14.9	621	B.
February	54	9	28.1	1,560	B.
March	84	24	57.3	3,520	A.
April 1-17	61	19	42.0	1,420	A.
The period	.....	.....	.....	7,120	

OCHOCO CREEK AT PRINEVILLE, OREG.

LOCATION.—In the SE. ¼ sec. 31, T. 14 S., R. 16 E., at the highway bridge in Prineville, one-fourth mile above the junction with the tailrace of the Prineville flour mill.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 14 to June 13, 1912, and December 15, 1913, to June 25, 1914.

GAGE.—Vertical staff on bridge abutment.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Rock and gravel; somewhat shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded December 15 to June 25, 2.88 feet at 4 p. m. March 22 (discharge, 415 second-feet); creek dry May 17-22 and probably all summer.

DIVERSIONS.—Station is below all diversions and shows only the unappropriated flow; the Rye Grass ditch diverts within a mile above and carries water around the gage.

ACCURACY.—Results good.

Discharge measurements of Ochoco Creek at Prineville, Oreg., for the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 15	F. F. Henshaw	1.56	8.2	Mar. 29	P. V. Hodges	2.25	1.47
15	do	1.56	8.8	Apr. 17	do	2.61	2.82
27	P. V. Hodges	2.40	1.85	June 7	do	1.11	a 2.0

a Estimated.

Daily discharge, in second-feet, of Ochoco Creek at Prineville, Oreg., for the period Dec. 15, 1913 to June 25, 1914.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	.....	28	57	307	75	46	6.0
2	.....	61	59	271	75	38	7.0
3	.....	45	55	211	100	22	.7
4	.....	63	38	215	125	13	.5
5	.....	112	41	219	195	7.0	.4
6	.....	110	50	227	160	5.8	.4
7	.....	102	38	298	160	3.8	.5
8	.....	100	59	298	160	3.2	.4
9	.....	90	23	335	142	2.0	.2
10	.....	82	24	375	150	4.5	.3
11	.....	71	41	365	215	1.7	.6
12	.....	69	59	380	223	1.0	.7
13	.....	65	55	375	280	.4	.8
14	.....	61	38	355	262	.2	.6
15	9	57	41	345	258	.2	.8
16	9	65	50	385	235	.1	.6
17	10	79	57	380	262	.0	.8
18	9	65	69	350	203	.0	.7
19	9	40	75	325	195	.0	.6
20	9	65	95	355	215	.0	.6
21	9	55	184	375	195	.0	.6
22	9	122	199	415	160	.0	.5
23	10	100	184	375	125	1.3	.4
24	9	112	203	294	125	1.4	.3
25	9	95	181	280	100	1.0	.2
26	9	108	188	195	98	.8	.....
27	9	71	203	195	88	.6	.....
28	9	73	207	167	75	.6	.....
29	10	71	.....	142	71	.4	.....
30	12	67	.....	112	55	.4	.....
31	23	65	.....	125	.....	.3	.....

NOTE.—Discharge determined from a rating curve well defined between 5 and 325 second-feet.

Monthly discharge of Ochoco Creek at Prineville, Oreg., for the period Dec. 15, 1913, to June 25, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
December 15–31	23	9	10.2	343	A.
January	122	28	76.4	4,700	B.
February	207	23	91.9	5,100	B.
March	415	112	292	18,000	B.
April	280	55	159	9,460	A.
May	46	0	5.02	309	B.
June 1–25	7	.2	1.01	54.5	C.
The period	.....	.....	.....	38,000	

METOLIUS RIVER AT HUBBARD'S RANCH, NEAR GRANDVIEW, OREG.

LOCATION.—In the SE. ¼ sec. 34, T. 10 S., R. 10 E., 9 miles above the station at Riggs ranch, 16 miles above mouth of river, 2 miles below Whitewater Creek, the lowest large tributary, about 20 miles from Grandview, and 35 miles from Sisters.

DRAINAGE AREA.—299 square miles.

RECORDS AVAILABLE.—April 24, 1910, to December 31, 1913, when station was discontinued.

GAGE.—Vertical staff on right bank.

DISCHARGE MEASUREMENTS.—Made from a cable half a mile below gage.

CHANNEL AND CONTROL.—Gravel and boulders; shifting; two channels below gage; right channel carried about 10 second-feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded October 1 to December 31, 0.36 foot at 4 p. m. November 6 (discharge, 1,770 second-feet); minimum stage recorded, 0.15 foot December 24–27 (discharge, 1,550 second-feet).

WINTER FLOW.—Discharge relation not seriously affected by ice.

DIVERSIONS.—A few small private irrigation ditches take out above station.

ACCURACY.—Results good.

The following measurement was made by P. V. Hodges:

April 14: Gade height, 0.38 foot; discharge, 1,760 second-feet.

Daily discharge, in second-feet, of Metolius River at Hubbard's ranch, near Grandview, Oreg., for the period October to December, 1913.

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1	1,600	1,600	1,600	11	1,700	1,600	1,600	21	1,600	1,600	1,600
2	1,600	1,600	1,600	12	1,700	1,600	1,600	22	1,600	1,600	1,600
3	1,600	1,600	1,600	13	1,700	1,600	1,600	23	1,600	1,700	1,600
4	1,600	1,600	1,600	14	1,700	1,600	1,600	24	1,600	1,600	1,600
5	1,600	1,600	1,600	15	1,600	1,600	1,600	25	1,600	1,600	1,600
6	1,600	1,810	1,600	16	1,600	1,600	1,600	26	1,600	1,600	1,600
7	1,700	1,700	1,600	17	1,600	1,600	1,600	27	1,600	1,600	1,600
8	1,700	1,700	1,600	18	1,600	1,600	1,600	28	1,600	1,600	1,600
9	1,600	1,700	1,600	19	1,600	1,600	1,600	29	1,600	1,700	1,600
10	1,600	1,700	1,600	20	1,600	1,600	1,600	30	1,600	1,600	1,600
								31	1,600	.....	1,600

NOTE.—Discharge determined from a rating curve well defined above and fairly well defined below 1,700 second-feet.

Monthly discharge of Metolius River at Hubbard's ranch, near Grandview, Oreg., for the period October to December, 1913.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	1,700	1,600	1,620	99,600	B.
November	1,810	1,600	1,630	97,000	B.
December	1,600	1,600	1,600	98,400	B.
The period	.....	.....	.....	295,000	

WHITEWATER CREEK NEAR GRANDVIEW, OREG.

LOCATION.—In the NE. ¼ sec. 28, T. 10 S., R. 10 E., one-fourth mile above mouth of creek, 15 miles northwest of Grandview and 27 miles north of Sisters.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 28, 1911, to December 31, 1913, when station was discontinued.

GAGE.—Vertical staff on right bank. Prior to September 18, 1911, vertical staff at about the same site and datum.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Gravel and boulders; control formed by fallen tree.

EXTREMES OF DISCHARGE.—Maximum stage recorded October 1 to December 31, 1.50 feet at 10 a. m. November 6 (discharge, 157 second-feet); minimum stage recorded, 0.80 foot at 12 m. December 28 (discharge, 30 second-feet).

WINTER FLOW.—Discharge relation not seriously affected by ice.

ACCURACY.—Results fair.

The following measurement was made by P. V. Hodges:
April 15, gage height, 1.52 feet; discharge, 161 second-feet.

Daily discharge, in second-feet, of Whitewater Creek near Grandview, Oreg., for the period October to December, 1913.

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1	50	38	45	11	46	54	40	21	44	46	42
2	45	38	44	12	46	52	39	22	43	46	40
3	40	68	43	13	46	49	38	23	42	46	37
4	39	98	42	14	47	46	37	24	41	46	35
5	38	127	41	15	48	44	36	25	41	47	34
6	37	157	41	16	48	43	36	26	40	48	33
7	39	116	40	17	48	42	36	27	40	48	31
8	42	88	40	18	47	41	35	28	40	47	30
9	44	60	40	19	46	44	37	29	39	47	32
10	45	57	40	20	45	46	40	30	39	46	33
								31	38	.....	35

NOTE.—Discharge determined from a fairly well defined rating curve.

Monthly discharge of Whitewater Creek near Grandview, Oreg., for the period October to December, 1913.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	50	37	43.0	2,640	C.
November	157	38	59.2	3,520	C.
December	45	30	37.8	2,320	C.
The period	.....	.....	.....	8,480	

SHITIKE CREEK AT WARM SPRING, OREG.

LOCATION.—In the NE. ¼ sec. 26, T. 9 S., R. 12 E., at Warm Spring, about 2 miles above mouth of creek and below all tributaries.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 11, 1911, to September 30, 1914.

GAGE.—Vertical staff on left bank opposite store.

DISCHARGE MEASUREMENTS.—Made from wading or from footbridge.

CHANNEL AND CONTROL.—Gravel and sand; likely to shift somewhat.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.00 feet at 4 p. m. October 7 (discharge, 295 second-feet); minimum stage recorded, 1.00 foot August 5 to September 5 (discharge, 63 second-feet).

WINTER FLOW.—Discharge relation apparently unaffected by ice.

DIVERSIONS.—Probably no diversion above station.

ACCURACY.—Results good.

Discharge measurements of Shitike Creek at Warm Spring, Oreg., for the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 24	R. R. Randell	1.03	68.9	June 11	P. V. Hodges	1.18	87.5
Apr. 22	P. V. Hodges	1.47	150	June 28	do	1.28	102
May 21	do	1.41	129				

Daily discharge, in second-feet, of Shitike Creek at Warm Spring, Oreg., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	84	84	91	91	84	118	96	118	118	100	70	63
2	84	84	84	91	84	128	100	118	118	108	70	63
3	84	84	84	108	84	140	100	118	118	151	70	63
4	84	84	91	245	84	164	100	108	108	118	70	63
5	84	91	91	128	84	164	100	100	108	108	63	63
6	84	128	84	118	84	164	100	100	108	108	63	70
7	295	128	84	118	84	164	91	100	108	100	63	70
8	151	100	84	118	84	164	91	100	100	100	63	77
9	140	91	84	108	77	164	91	100	100	100	63	77
10	128	91	84	108	70	151	91	108	100	100	63	77
11	128	91	84	100	70	151	91	108	100	91	63	77
12	118	84	77	100	70	164	100	118	108	100	63	77
13	118	84	77	91	70	164	100	128	108	91	63	77
14	118	77	77	91	70	176	118	128	100	91	63	77
15	118	77	77	84	70	164	216	140	100	91	63	84
16	108	77	77	84	84	151	140	151	108	91	63	100
17	108	77	80	84	84	140	118	151	118	91	63	100
18	108	77	84	91	84	140	118	140	128	84	63	100
19	100	70	84	91	77	128	128	140	118	84	63	100
20	91	70	84	100	70	118	140	140	108	77	63	91
21	91	70	91	108	70	100	140	128	108	77	63	91
22	84	70	91	108	70	100	140	118	100	77	63	91
23	77	77	91	100	70	100	140	118	91	77	63	84
24	77	77	91	118	70	100	140	118	118	77	63	84
25	77	77	91	108	70	100	128	118	108	77	63	84
26	77	84	91	100	84	91	128	118	100	77	63	84
27	77	84	91	91	100	91	128	128	108	77	63	84
28	77	108	91	91	128	91	128	128	108	70	63	84
29	77	100	91	91	.....	91	128	128	108	70	63	84
30	118	100	91	91	.....	91	118	128	100	70	63	84
31	118	.....	91	91	.....	94	.....	128	.....	70	63	.....

NOTE.—Discharge determined from a well-defined rating curve.

Monthly discharge of Shitike Creek at Warm Spring, Oreg., for the year ending Sept. 30, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	295	77	106	6,520	B.
November	128	70	86.5	5,150	B.
December	91	77	85.9	5,280	B.
January	245	84	105	6,460	B.
February	128	70	79.6	4,420	B.
March	176	91	131	8,060	B.
April	216	91	118	7,020	B.
May	151	100	122	7,500	B.
June	128	91	108	6,430	A.
July	151	70	90.4	5,560	A.
August	70	63	63.9	3,930	A.
September	100	63	80.8	4,810	A.
The year	295	63	98.2	71,100	

WARM SPRINGS RIVER NEAR WARM SPRING, OREG.

LOCATION.—In the NE. ¼ sec. 19, T. 8 S., R. 13 E., at bridge on road between Warm Spring and Simnasho, 9 miles from the former and 15 miles from the latter.

DISCHARGE AREA.—Not measured.

RECORDS AVAILABLE.—July 29, 1911, to September 30, 1914; fragmentary.

GAGE.—Vertical staff spiked to upstream side of right abutment of old bridge, July 29, 1911, to July 1, 1914: Stevens's water-stage recorder after July 1, 1914, fastened to downstream side of right abutment.

DISCHARGE MEASUREMENTS.—Made from upstream side of bridge or wading.

CHANNEL AND CONTROL.—Gravel; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded January 1 to September 30, 2.00 feet at 5 p. m. March 9 (discharge 910 second-feet); minimum stage from water-stage recorder, 0.77 foot, August 28–29 (discharge 202 second-feet).

WINTER FLOW.—River probably never freezes.

DIVERSIONS.—None.

ACCURACY.—Rating curve good; accuracy depends on gage readings which well cover low stages; results for high stage only approximate.

Discharge measurements of Warm Springs River near Warm Spring, Oreg., for the year ending Sept. 30, 1914.

[Made by P. V. Hodges.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Apr. 23	1.55	558	June 29	1.00	2.65
June 10	1.10	310			

Daily discharge, in second-feet, of Warm Springs River near Warm Spring, Oreg., for the period Jan. 1 to Sept. 30, 1914.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1				405		405	267	216	216
2		460	460				264	219	219
3				405			264	219	225
4					520		264	216	222
5	580					380	261	216	216
6		400	520	460			261	216	210
7							261	219	210
8					520	380	261	216	213
9	460	400	910				258	213	213
10				590		310	255	213	213
11					520		255	213	219
12	460					355	252	213	216
13		400	800	590			249	213	216
14							246	210	228
15					460	355	240	210	231
16	460	400	730				237	208	246
17				590			234	208	258
18					460		228	205	264
19	520					332	225	205	258
20		460	660				228	205	252
21							228	205	255
22					460	310	228	205	252
23	770	580	460	555			225	205	249
24							222	205	249
25					405		219	205	249
26	700					310	219	205	264
27		640	405	555		278	219	205	264
28							219	202	264
29					432	270	219	202	264
30	460			520			216	208	267
31							219	210	

NOTE.—Discharge determined from two rating curves applicable as follows: Jan. 1 to Mar. 9, fairly well defined; Mar. 10 to Sept. 30, well defined between 200 and 700 second-feet. No readings Oct. 1 to Dec. 31. Observations from January to June scattering and do not check readings by hydrographers. Determinations from water-stage recorder from July 2 to end of year slightly uncertain.

Monthly discharge of Warm Springs River near Warm Spring, Oreg., for the period Jan. 1 to Sept., 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January			551	33,900	C.
February			468	26,000	C.
March			618	38,000	C.
April			519	30,900	C.
May			472	29,000	C.
June			335	19,900	C.
July	267	216	240	14,800	B.
August	219	202	210	12,900	B.
September	267	210	237	14,100	B.
The period				220,000	

NOTE.—Mean monthly discharge January to June taken as the mean of the observations in the month. Accuracy rating reduced on account of uncertainties in the gage-height record.

WHITE RIVER NEAR TYGH VALLEY, OREG.

LOCATION.—In the SW. ¼ sec. 10, T. 4 S., R. 13 E., 1 mile south of Tygh Valley, 1 mile above mouth of Tygh Creek, and 4 miles above the White River Falls plant of Pacific Power & Light Co.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 18, 1911, to September 30, 1914.

GAGE.—Vertical staff on lower corner of left pier of highway bridge.

DISCHARGE MEASUREMENTS.—Made from lower side of highway bridge.

CHANNEL AND CONTROL.—Gravel and sand; slightly shifting; White River carries a heavy load of glacial sediment at times.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.30 feet at 8 a. m. January 22 (discharge, 1.040 second-feet); minimum stage recorded, 0.42 feet September 4–8 (discharge, 130 second-feet).

WINTER FLOW.—Discharge relation at times affected by ice; ice jams occasionally form during extremely cold weather.

DIVERSIONS.—Probably no diversion from White River above station, although diversion of water for irrigation of lands south of lower White River is probably feasible.

ACCURACY.—Results excellent.

Discharge measurements of White River near Tygh Valley, Oreg., for the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 22	R. R. Randell	0.55	178.
June 12	P. V. Hodges	.92	292

Daily discharge, in second-feet, of White River near Tygh Valley, Oreg., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	136	168	214	250	510	510	410	560	320	210	150	138
2	136	162	205	244	460	460	410	485	320	204	150	138
3	136	157	214	257	460	410	410	510	320	204	150	138
4	136	162	205	268	460	410	460	535	320	204	150	130
5	136	162	214	485	460	410	560	510	312	195	150	130
6	136	292	205	535	385	535	535	510	300	186	150	130
7	510	235	205	615	410	535	510	510	320	186	150	130
8	226	220	214	615	410	560	510	510	320	186	150	130
9	220	196	214	535	385	560	560	510	320	186	150	150
10	190	205	205	510	410	535	725	510	288	180	150	138
11	292	196	205	460	410	510	698	485	273	180	150	130
12	220	190	220	460	410	510	670	460	280	180	150	145
13	205	184	220	435	410	485	642	485	280	186	145	130
14	196	184	214	460	360	560	698	510	262	180	145	130
15	205	176	214	410	360	615	725	535	252	180	145	238
16	220	176	220	410	320	725	698	510	252	180	145	204
17	196	176	214	410	302	725	615	485	252	180	145	195
18	190	168	214	410	278	725	615	460	252	174	138	180
19	190	168	214	385	250	725	642	410	245	174	150	165
20	190	168	214	385	220	725	670	410	245	165	145	150
21	190	162	196	485	285	670	615	410	245	156	156	174
22	184	168	190	975	235	642	560	410	245	156	150	150
23	176	220	205	785	220	615	560	410	238	156	138	150
24	176	220	205	755	235	615	535	410	252	156	145	130
25	168	220	220	670	268	560	510	385	252	156	145	145
26	162	205	220	698	250	510	560	360	245	156	138	156
27	168	220	226	615	268	485	535	360	217	156	145	150
28	162	214	220	510	588	460	460	360	210	156	145	138
29	162	214	220	535	.....	460	460	320	210	156	150	130
30	162	220	220	535	.....	410	485	320	210	150	138	138
31	157	.....	226	510	.....	410	.....	320	.....	150	138	.....

NOTE.—Discharge determined from two rating curves applicable as follows: Oct. 1 to Apr. 10, well defined between 150 and 1,000 second-feet; Apr. 11 to Sept. 30, well defined between 150 and 1,000 second-feet. Slush ice was reported a few times during the winter, but apparently it did not affect the discharge relation.

Monthly discharge of White River near Tygh Valley, Oreg., for the year ending Sept. 30, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	510	136	191	11,700	A.
November	292	157	193	11,500	A.
December	226	190	213	13,100	A.
January	975	244	497	30,600	A.
February	588	220	358	19,900	A.
March	725	410	551	33,900	A.
April	725	410	568	33,800	A.
May	560	320	450	27,700	A.
June	320	210	269	16,000	A.
July	210	150	175	10,800	B.
August	156	138	147	9,040	B.
September	238	130	149	8,870	B.
The year	975	130	313	227,000	

KLICKITAT RIVER NEAR GLENWOOD, WASH.

LOCALITY.—In the NE. ¼ sec. 14, T. 7 N., R. 12 E., just below Dairy Creek, 2½ miles below the southern boundary of the Yakima Indian Reservation, 3 miles below Big Muddy Creek, and about 6 miles north of Glenwood.

DRAINAGE AREA.—356 square miles.

RECORDS AVAILABLE.—December 16, 1910, to September 30, 1914, at present site; October 9, 1909, to December 15, 1910, at a point 1 mile above, in sec. 11.

GAGE.—Stevens's water-stage recorder referred to vertical staff; prior to July 19, 1910, several vertical staffs.

DISCHARGE MEASUREMENTS.—Made at a cable bridge just below gage.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 2.93 feet at 9 a. m. January 7 (discharge, 2,890 second-feet); minimum stage from water-stage recorder, 0.46 foot at 5 p. m. December 21 (discharge, 363 second-feet).

ACCURACY.—Results excellent.

Discharge measurements of Klickitat River near Glenwood, Wash., during the year ending Sept. 30, 1914.

[Made by A. G. Hanson.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Jan. 1	0.55	434	Mar. 28	1.67	1,080	July 12	1.51	910
31	1.11	652	Apr. 25	2.38	1,930	Aug. 2	1.24	697
Feb. 28	1.19	702	May 24	2.56	2,110	Sept. 4	.94	512

Daily discharge, in second-feet, of Klickitat River near Glenwood, Wash., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	494	506	538	414	628	820	924	1,880	1,700	1,050	770	569
2	500	500	487	450	626	773	940	2,180	1,820	1,060	748	548
3	475	494	438	469	625	745	1,030	2,580	1,820	1,070	726	527
4	463	494	444	738	623	746	1,120	2,420	1,630	1,070	705	506
5	456	512	487	1,890	621	747	1,330	2,260	1,450	980	684	506
6	475	578	494	2,480	619	750	1,380	2,180	1,340	938	691	506
7	500	538	475	2,780	617	752	1,500	2,100	1,280	938	650	496
8	487	532	456	2,070	610	804	1,620	2,100	1,220	938	644	480
9	475	538	432	1,780	602	852	1,680	2,020	1,170	938	644	485
10	481	545	438	1,480	595	860	1,810	2,100	1,120	938	638	496
11	558	538	475	1,190	588	860	1,950	2,100	1,070	938	644	490
12	585	523	475	1,100	580	876	1,950	2,180	1,120	938	644	485
13	640	509	463	1,020	572	908	2,180	2,340	1,170	1,020	638	480
14	626	494	438	976	565	985	2,260	2,580	1,170	938	650	490
15	599	481	438	916	560	1,080	2,740	2,740	1,220	895	638	545
16	571	494	432	892	555	1,120	2,500	2,520	1,280	895	593	545
17	545	585	438	860	560	1,220	2,260	2,310	1,340	895	569	605
18	545	558	420	820	555	1,330	2,100	2,240	1,280	895	569	599
19	558	519	438	766	555	1,380	2,420	2,170	1,220	895	575	631
20	564	500	414	759	555	1,440	2,500	2,100	1,170	887	557	581
21	564	500	391	752	606	1,380	2,260	2,170	1,120	808	563	551
22	564	500	426	788	612	1,380	2,100	2,170	1,070	792	569	534
23	564	578	426	820	595	1,380	2,100	2,170	980	792	575	534
24	564	606	420	752	617	1,330	1,950	2,100	1,170	800	569	534
25	571	578	420	766	612	1,280	1,950	1,960	1,120	792	569	545
26	578	606	414	738	600	1,120	1,950	1,820	1,020	778	581	638
27	538	700	414	698	692	1,120	1,810	1,700	1,020	778	581	587
28	532	633	409	668	710	1,080	1,680	1,570	1,030	762	587	545
29	512	606	403	674	.....	1,030	1,620	1,510	1,040	762	593	534
30	500	571	409	668	.....	985	1,680	1,510	1,040	778	612	528
31	494	.....	432	662	.....	940	.....	1,570	.....	778	590	.....

NOTE.—Discharged determined from three rating curves applicable as follows: Oct. 1 to Jan 7, fairly well defined; Jan. 8 to May 15, well defined; May 16 to Sept. 30, well defined. Discharge interpolated, for lack of gage readings, Nov. 12 and 13; Jan. 9 and 10; Feb. 2–6 and 8–13; Mar. 4–6; May 16; June 28 to July 2; and Aug. 31 to Sept. 3.

Monthly discharge of Klickitat River near Glenwood, Wash., for the year ending Sept. 30, 1914.

[Drainage area 356 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
October	640	456	535	1.50	1.73	32,900	A.
November	700	481	544	1.53	1.71	32,400	A.
December	538	391	441	1.24	1.43	27,100	A.
January	2,780	414	1,030	2.89	3.33	63,300	A.
February	710	555	602	1.69	1.76	33,400	A.
March	1,440	745	1,030	2.89	3.33	63,300	A.
April	2,740	924	1,840	5.17	5.77	109,000	A.
May	2,740	1,510	2,110	5.93	6.84	130,000	A.
June	1,820	980	1,240	3.48	3.88	73,800	A.
July	1,070	762	895	2.51	2.89	55,000	A.
August	770	557	625	1.76	2.03	38,400	A.
September	638	480	537	1.51	1.68	32,000	A.
The year	2,780	391	954	2.68	36.38	691,000	

HOOD RIVER AT DEE, OREG.

LOCATION.—In the NW. ¼ sec. 7, T. 1 N., R. 10 E., 400 feet below mill dam and 300 feet above highway bridge in Dee.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 21 to September 30, 1914.

GAGE.—Vertical staff on left bank.

DISCHARGE MEASUREMENTS.—Made from cable about 600 feet below gage.

CHANNEL AND CONTROL.—Rock and boulders; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.3 feet at 5 p. m. January 4 (discharge, 1,290 second-feet); minimum stage recorded, 4.00 feet at 6 p. m. August 28 (discharge, 60 second-feet).

WINTER FLOW.—Discharge relation unaffected by ice.

DIVERSIONS.—Several small ditches divert water for irrigation above station. The East Fork irrigation district canal diverts water through a divide to lands outside the drainage area.

REGULATION.—The flow is quite irregular, especially during low water, owing to changes in load on power plant at mill of Oregon Lumber Co. just above gage.

ACCURACY.—Records good except for extremely low water, for which they are poor.

Discharge measurements of Hood River at Dee, Oreg., for the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
Mar. 16[a]	Henshaw and Hodges	6.00	904	May 15	P. V. Hodges	5.28	607
16	.....do	5.54	815	Sept. 8	H. J. Dean	4.48	200

[a] Measurement very uncertain on account of rapid fluctuation of stage.

Daily discharge, in second-feet, of Hood River at Dee, Oreg., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	305	282	305	305	405	690	432	460	570	427	355	.....
2	355	305	305	305	405	690	460	460	600	422	355	.....
3	305	282	305	570	460	630	460	630	570	438	375	.....
4	282	305	282	1,250	460	660	460	630	488	460	460	.....
5	260	282	260	780	460	630	630	630	432	395	380	215
6	330	282	260	935	460	630	570	630	432	395	345	215
7	870	405	238	750	460	630	570	630	427	416	335	215
8	405	405	260	570	460	630	600	630	427	375	325	215
9	355	405	260	542	405	630	630	630	416	375	380	215
10	305	405	330	515	405	630	690	630	380	385	375	206
11	432	405	260	515	405	630	690	570	390	400	375	215
12	380	405	305	515	405	630	690	570	410	405	380	215
13	355	305	260	488	405	630	690	630	460	422	385	215
14	330	305	260	405	405	630	690	660	385	427	405	282
15	305	305	260	405	405	630	935	660	432	405	395	380
16	355	260	282	405	405	750	810	600	488	375	360	330
17	260	260	282	405	405	750	690	630	460	375	380	630
18	260	260	305	405	405	750	690	630	438	350	385	355
19	305	260	215	460	405	750	690	570	460	400	355	380
20	305	260	305	515	405	690	690	570	405	380	345	330
21	305	260	260	1,000	405	690	690	600	400	260	365	282
22	260	282	282	870	405	690	630	630	335	278	385	269
23	238	515	215	840	432	630	630	630	365	300	350	269
24	380	380	260	750	460	630	630	630	416	325	.....	282
25	305	355	260	570	515	630	630	570	427	320	.....	282
26	305	355	260	570	630	570	630	488	365	355	.....	365
27	260	355	260	570	810	570	630	488	385	350	.....	305
28	282	355	260	570	810	570	570	460	385	330	.....	282
29	282	355	260	570	.....	515	570	432	360	330	.....	260
30	282	355	260	542	.....	515	515	449	360	325	.....	260
31	260	.....	282	542	.....	488	.....	488	.....	335	.....	.....

NOTE.—Discharge determined from a well-defined rating curve. Discharge interpolated because of fluctuations in flow not determined by only two gage readings a day, Aug. 24 to Sept. 4.

Monthly discharge of Hood River at Dee, Oreg., for the year ending Sept. 30, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	870	238	330	20,300	A.
November	515	260	332	19,800	A.
December	330	215	271	16,700	A.
January	1,250	305	595	36,600	A.
February	810	405	461	25.600	A.
March	750	488	638	39,200	A.
April	935	432	630	37,500	A.
May	660	432	578	35,500	A.
June	600	335	429	25,500	A.
July	460	260	372	22,900	A.
August	460	.....	354	21,800	B.
September	630	206	281	16,700	B.
The year	1,250	206	439	318,000	

HOOD RIVER AT TUCKER BRIDGE, NEAR HOOD RIVER, OREG.

LOCATION.—In the SE. ¼ sec. 15, T. 2 N., R. 10 E., at Tucker Bridge, 5 miles south of of the town of Hood River.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 20, 1897, to December 31, 1899; August 27, 1913, to September 30, 1914.

GAGE.—Chain gage attached to highway bridge; gage used 1897–1899 was of wire type and attached to earlier bridge. No determined relation between datum of present gage and that of wire gage.

DISCHARGE MEASUREMENTS.—Made from bridge.

CHANNEL AND CONTROL.—Rocks and boulders; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.6 feet at 4 p. m. January 5 (discharge, 4,780 second-feet); minimum stage recorded, 0.90 foot at 3 p. m. September 10 (discharge, 350 second-feet; probably not the absolute minimum for year as the record is very fragmentary during August and September).

WINTER FLOW.—Discharge relation unaffected by ice.

DIVERSIONS.—Several large diversions for irrigation above station. Power flume diverts a few hundred feet above the bridge and discharges directly below it; diversion included in estimates.

REGULATION.—Water stored at sawmill at Dee.

ACCURACY.—Results fair.

Discharge measurements of Hood River at Tucker Bridge, near Hood River, Oreg., for the period Oct. 1, 1913, to Nov. 18, 1914.

Date.	Made by—	Gage height.	Discharge.		
			River.	Flume.	Total.
Mar. 18	Henshaw and Hodges	3.96	1,800	40	1,840
21	P. V. Hodges	3.58	1,570	33	1,600
May 17	....do	2.86	894	182	1,080
Sept. 10	H. J. Dean	.90	302	45	347
Oct. 6	Stewart and Hodges	1.82	576	43	619
Nov. 18	Paulsen and Hanson	2.41	779	[a]40	819

[a] Estimated.

Daily discharge, in second-feet, of Hood River at Tucker Bridge, near Hood River, Oreg., for the period Sept. 1, 1913, to Sept. 30, 1914.

Day.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	590	495	660	880	525	1,220	1,990	880	1,040	740	700	495	385
2	555	555	660	830	590	1,100	1,820	880	1,160	740	660	495	410
3	925	555	590	785	590	1,040	1,740	880	1,100	785	660	495	410
4	1,150	555	590	785	1,160	1,040	1,740	1,160	1,100	785	637	495	.....
5	986	525	785	700	4,520	980	1,900	1,360	1,100	785	613	495	.....
6	704	590	1,740	740	2,870	880	1,900	1,100	1,160	785	590	495	.....
7	636	1,990	1,360	660	3,310	880	1,900	1,100	1,160	785	625	495	.....
8	676	930	1,100	660	2,460	880	1,900	1,100	1,290	785	590	495	.....
9	660	930	1,060	590	1,740	785	1,820	1,290	1,220	785	590	.....	.....
10	600	880	980	525	1,430	785	1,580	1,580	1,160	740	625	.....	.....
11	594	1,160	820	590	1,160	830	1,430	1,500	1,160	740	625	.....	.....
12	590	880	820	590	1,100	830	1,360	1,740	1,160	740	625	.....	.....
13	622	1,100	750	590	980	830	1,580	1,740	1,160	785	590	.....	.....
14	611	1,100	680	590	980	785	1,740	1,820	1,100	740	590	.....	.....
15	600	1,100	680	625	930	785	2,080	2,460	1,040	700	590	.....	.....
16	625	980	680	590	930	740	2,260	1,990	1,040	700	590	.....	.....
17	676	880	680	590	880	740	2,260	1,820	1,040	660	590	.....	.....
18	639	830	680	590	880	740	2,080	1,500	1,100	660	555	.....	.....
19	590	830	650	555	785	740	1,900	1,660	1,100	660	555	.....	.....
20	586	785	680	590	740	740	1,820	1,660	1,100	660	555	.....	.....
21	680	785	680	590	1,040	880	1,580	1,500	1,040	660	525	.....	.....
22	696	740	930	590	2,980	930	1,430	1,430	980	660	525	.....	.....
23	580	700	2,080	590	3,550	980	1,430	1,290	1,040	625	525	.....	.....
24	549	700	1,360	555	2,460	1,290	1,360	1,160	930	625	525	.....	.....
25	546	625	1,160	555	1,990	2,170	1,160	1,160	880	660	495	365	.....
26	525	625	980	525	1,820	2,760	1,100	1,100	830	660	495	385	.....
27	492	625	980	525	1,580	2,460	1,040	1,100	830	700	495	435	.....
28	486	625	930	525	1,220	2,170	1,040	980	785	700	495	410	.....
29	549	625	914	525	1,160	.....	980	930	740	700	525	410	.....
30	510	625	897	525	1,160	.....	980	930	740	700	525	398	.....
31	.....	625	.....	590	1,290	.....	980	.....	740	.....	495	385	.....

NOTE.—Discharge determined from a rating curve well defined below 2,500 second-feet. Discharge obtained from record at Powderdale for lack of gage readings, Nov. 9–21. Discharge interpolated for lack of gage reading, Feb. 22. Discharge determined from gage heights for Aug. 29, 30, and 31, 1913, as 672, 604, and 636 second-feet, respectively.

Monthly discharge of Hood River at Tucker Bridge, near Hood River, Oreg., from September, 1913, to July, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
1913.					
September	1,150	486	641	38,100	C.
1913–14.					
October	1,990	495	805	49,500	B.
November	2,080	590	919	54,700	C.
December	880	525	618	38,000	B.
January	4,520	525	1,570	96,500	B.
February	2,760	740	1,110	61,600	B.
March	2,260	980	1,610	99,000	B.
April	2,460	880	1,360	80,900	B.
May	1,290	740	1,030	63,300	B.
June	785	625	715	42,500	C.
July	700	495	574	35,300	C.
The period				621,000	

HOOD RIVER AT POWERDALE, NEAR HOOD RIVER, OREG.

LOCATION.—In the SE. ¼ sec. 36, T. 3 N., R. 10 E., opposite power house of Pacific Power & Light Co. at Powerdale, three-fourths mile above town of Hood River and 1½ miles above mouth of stream.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 31, 1913, to September 30, 1914.

GAGE.—Vertical staff on right bank, opposite power plant; a second gage at railroad bridge, one-half mile below in NE. ¼ sec. 36, below the discharge of the tailrace.

DISCHARGE MEASUREMENTS.—Made from cable.

CHANNEL AND CONTROL.—Rock and boulders; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.0 feet, January 5 (discharge, 4,800 second-feet; total discharge, including tailrace, 4,880 second-feet); minimum stage recorded, 1.10 feet at 3 p. m. August 18 (discharge, 125 second-feet; total discharge, including tailrace, 220 second-feet).

WINTER FLOW.—Discharge relation not materially affected by ice.

DIVERSIONS.—Large diversions for irrigation above station; power plant diverts around station; diversion was included in estimate for 1913 but has been computed separately for 1914.

REGULATION.—Water stored at sawmill at Dee has considerable effect at low water.

ACCURACY.—Results good.

Discharge measurements of Hood River at Powerdale, near Hood River, Oreg., during the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.
	GAGE OPPOSITE POWER PLANT.		
		Feet.	*Sec.-ft.*
Mar. 19, 1914	Henshaw and Hodges	3.46	2,270
May 16, 1914	P. V. Hodges	2.76	1,190
Sept. 11, 1914	H. J. Dean	1.49	280
	GAGE AT RAILROAD BRIDGE.		
Aug. 27, 1913	R. R. Randell	2.69	593
Mar. 19, 1914	Henshaw and Hodges	4.01	2,350
Sept. 11, 1914	H. J. Dean	2.20	374

Daily discharge, in second-feet, of Hood River at Powerdale, near Hood River, Oreg., for the year ending Sept. 30, 1914.

Gage opposite power plant.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	370	530	1,070	530	1,450	3,350	1,070	1,160	1,070	705	600	430
2	400	530	900	565	1,160	2,240	1,070	1,200	1,120	635	600	370
3	400	495	980	530	1,160	1,950	1,120	1,560	1,120	705	600	370
4	400	495	740	1,250	1,160	1,950	1,350	1,350	980	820	600	400
5	400	670	740	4,800	1,160	2,090	1,560	1,250	900	670	530	280
6	370	1,680	670	2,850	900	2,090	1,400	1,200	900	600	635	370
7	2,020	1,160	670	3,720	900	2,090	1,350	1,200	1,020	530	565	340
8	740	980	670	2,850	900	2,090	1,350	1,350	980	600	530	310
9	670	980	670	2,090	740	2,090	1,450	1,400	1,020	600	495	310
10	670	900	600	1,560	740	1,810	2,240	1,350	900	565	400	280
11	900	740	600	1,350	600	1,680	1,950	1,250	820	565	430	340
12	740	740	530	1,160	900	1,450	1,810	1,200	820	635	460	370
13	900	670	530	1,160	900	1,680	2,240	1,300	780	670	600	340
14	980	600	600	1,160	670	1,950	1,950	1,350	780	565	600	370
15	820	600	565	1,070	670	2,240	2,850	1,350	780	565	565	820
16	820	600	565	1,070	600	2,390	2,240	1,250	780	565	495	565
17	670	600	600	1,070	600	2,240	1,810	1,200	705	600	460	740
18	670	600	600	980	530	2,090	1,810	1,160	740	530	280	740
19	670	565	430	900	530	2,090	2,090	1,020	705	600	460	820
20	670	600	460	900	600	1,810	1,950	1,020	600	565	460	820
21	600	600	495	1,450	740	1,810	1,680	1,070	600	530	400	670
22	600	670	495	3,180	740	1,680	1,560	1,120	600	600	430	530
23	600	2,240	530	3,720	740	1,560	1,450	1,160	530	600	370	460
24	530	1,680	430	3,010	1,950	1,450	1,450	1,160	820	565	400	430
25	530	1,250	530	1,950	1,950	1,450	1,,50	1,160	780	600	400	460
26	530	1,250	530	1,950	1,450	1,350	1,350	1,020	705	600	460	565
27	530	1,070	495	1,680	3,180	1,250	1,300	1,070	705	600	340	600
28	530	980	495	1,450	2,540	1,200	1,200	980	705	565	430	530
29	495	1,160	495	1,250	.....	1,200	1,160	940	670	565	340	460
30	495	1,160	495	1,160	.....	1,120	1,160	900	635	600	400	460
31	495	.....	530	1,250	.....	1,120	.....	940	.....	600	400	.....

NOTE.—Discharge determined from a well-defined rating curve. Discharge Oct. 1 to Mar. 27 obtained from one gage reading a day; Mar. 28 to Sept. 30, from four readings a day.

Daily discharge, in second-feet, of Hood River at Powerdale, near Hood River, Oreg., for the period Aug. 17 to Sept. 30, 1914.

Bridge gage.

	Aug.	Sept.		Aug.	Sept.		Aug.	Sept.
1	.....	495	11	.....	435	21	495	760
2	.....	435	12	.....	465	22	528	625
3	.....	435	13	.....	435	23	465	560
4	.....	495	14	.....	465	24	495	528
5	.....	375	15	.....	900	25	495	560
6	.....	435	16	.....	658	26	560	658
7	.....	435	17	465	830	27	435	658
8	.....	405	18	435	830	28	528	625
9	.....	405	19	495	900	29	435	560
10	.....	375	20	560	900	30	465	560
						31	495	.....

NOTE.—Discharge determined from a well-defined rating curve.

Monthly discharge of Hood River at Powerdale, near Hood River, Oreg., for the year ending Sept. 30, 1914.

Gage opposite power plant.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	2,020	370	652	40,100	B.
November	2,240	495	893	53,100	B.
December	1,070	430	604	37,100	B.
January	4,800	530	1,730	106,000	B.
February	3,180	530	1,080	60,000	B.
March	3,350	1,120	1,820	112,000	B.
April	2,850	1,070	1,610	95,800	B.
May	1,560	900	1,180	72,600	B.
June	1,120	530	809	48,100	B.
July	820	530	604	37,100	B.
August	635	280	475	29,200	B.
September	820	280	485	28,900	B.
The year	4,800	280	995	720,000	

Bridge gage.

Aug. 17-31	560	435	490	14,600	B.
September	900	375	573	34,100	B.

Combined monthly discharge of Hood River and tailrace at Powerdale, near Hood River, Oreg., for the year ending Sept. 30, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	2,090	427	730	44,900	B.
November	2,340	563	979	58,300	B.
December	1,170	523	696	42,800	B.
January	4,890	610	1,820	112,000	B.
February	3,270	619	1,170	65,000	B.
March	3,440	1,200	1,900	117,000	B.
April	2,930	1,160	1,690	101,000	B.
May	1,620	955	1,270	78,100	B.
June	1,140	633	882	52,500	B.
July	835	615	682	41,900	B.
August	729	375	560	34,400	B.
September	914	376	564	33,600	B.
The year	4,890	375	1,080	781,000	

NOTE.—Accuracy rating reduced because of uncertainty as to discharge of tailrace and power regulation.

EAST FORK OF HOOD RIVER NEAR MOUNT HOOD, OREG.

LOCATION.—In the NE. ¼ sec. 5, T. 1 S., R. 10 E., about 5 miles above mouth of East Fork, 2 miles south of Mount Hood post office; 2 miles east of Parkdale station on the Mount Hood Railroad.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 17, 1913, to September 30, 1914.

GAGE.—Vertical staff.

DISCHARGE MEASUREMENTS.—Made from a cable one-half mile above gage or by wading.

CHANNEL AND CONTROL.—Gravel and small boulders; somewhat shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.15 feet at 4 p. m. October 8 (discharge, 503 second-feet); minimum stage recorded, 4.85 feet at 5 p. m. September 8 (discharge, 66 second-feet).

DIVERSIONS.—The East Fork irrigation district canal diverts about three-fourths mile and the Mount Hood ditch about one-fourth mile above gage, and carry their water around the gage. The Glacier ditch diverts about 6 miles above gage and waters lands above station.

ACCURACY.—Results fair.

Discharge measurements of East Fork of Hood River near Mount Hood, Oreg., during the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 17	Henshaw and Hodges..	5.88	398	Sept. 9	H. J. Dean.....	4.90	72.5
May 12	P. V. Hodges.....	5.78	307				

Daily discharge, in second-feet, of East Fork of Hood River near Mount Hood, Oreg., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	146	127	127	.....	178	359	241	316	259	193	127	88
2.....	146	106	127	.....	178	316	259	277	277	208	127	106
3.....	146	106	127	.....	178	277	259	316	316	208	127	97
4.....	146	106	127	.....	178	259	259	316	316	241	127	88
5.....	133	151	116	.....	178	241	277	316	316	193	208	72
6.....	256	127	116	.....	178	316	296	296	316	208	127	72
7.....	478	208	116	.....	178	316	296	296	241	208	116	66
8.....	503	178	116	277	164	316	296	338	208	178	106	72
9.....	316	208	116	277	151	316	359	316	208	151	106	80
10.....	241	178	116	241	164	296	406	316	193	178	106	72
11.....	208	178	116	241	164	277	359	316	178	178	106	80
12.....	178	127	106	241	178	277	359	316	208	193	178	80
13.....	193	127	106	208	178	296	406	338	208	208	178	88
14.....	208	127	106	208	164	338	406	382	208	178	127	116
15.....	241	127	106	208	164	359	406	359	224	178	127	139
16.....	224	127	116	193	151	382	406	359	208	164	106	178
17.....	178	127	116	208	151	359	406	359	208	164	97	193
18.....	151	127	116	208	151	359	406	359	241	164	97	208
19.....	151	127	116	208	164	338	406	359	241	178	97	224
20.....	151	127	106	208	178	316	406	338	208	164	97	241
21.....	151	127	106	208	178	316	359	359	208	151	97	259
22.....	151	178	106	277	164	316	359	359	193	151	97	241
23.....	151	208	106	316	178	316	359	406	178	139	97	241
24.....	127	178	127	241	178	316	338	338	208	139	97	259
25.....	127	178	127	241	208	296	338	316	208	127	88	241
26.....	127	151	127	241	178	277	316	277	178	127	97	241
27.....	127	151	127	208	406	277	316	277	193	127	88	241
28.....	127	151	127	208	316	259	296	241	193	127	97	224
29.....	127	151	127	208	.....	259	277	259	208	127	88	224
30.....	127	151	127	208	.....	259	241	277	193	139	88	208
31.....	127	.....	127	208	.....	241	.....	259	.....	127	97	.....

NOTE.—Discharge determined from a well-defined rating curve. Mean discharge Jan. 1-7 estimated 350 second-feet. Discharge estimates are based on one gage reading a day and are somewhat uncertain, especially from Sept. 15-26, owing to diurnal fluctuations caused by melting snow.

Monthly discharge of East Fork of Hood River near Mount Hood, Oreg., for the year ending Sept. 30, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October.....	503	127	189	11,600	B.
November.....	208	106	148	8,810	B.
December.....	127	106	118	7,260	B.
January.....	.....	.....	256	15,700	C.
February.....	406	151	185	10,300	B.
March.....	382	241	305	18,800	B.
April.....	406	241	337	20,100	B.
May.....	406	241	321	19,700	B.
June.....	316	178	225	13,400	B.
July.....	241	127	168	10,300	B.
August.....	208	88	113	6,950	B.
September.....	259	66	158	9,400	C.
The year.....	503	66	210	152,000	

NOTE.—Accuracy reduced on account of uncertainties in gage-height record.

EAST FORK IRRIGATION DISTRICT CANAL NEAR MOUNT HOOD, OREG.

LOCATION.—In the SW. ¼ sec. 34, T. 1 N., R. 10 E., 1 mile below intake, about 1½ miles south of Mount Hood post office, and 2 miles east of Parkdale station on the Mount Hood Railroad.

RECORDS AVAILABLE.—June 17, 1913, to September 30, 1914.

GAGE.—Vertical staff on side of flume.

DISCHARGE MEASUREMENTS.—Made from flume bent or by wading.

CHANNEL AND CONTROL.—Flume about 9 feet wide; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.7 feet August 1 and 2 (discharge, 76 second-feet); canal dry throughout winter and at various other times.

WINTER FLOW.—No water carried in cold weather.

ACCURACY.—Results excellent.

Discharge measurements of East Fork irrigation district canal near Mount Hood, Oreg., during the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 12	P. V. Hodges	[a] 1.20	33.6
Sept. 9	H. J. Dean	2.05	52.7

[a] Observer's reading for the day.

Daily discharge, in second-feet, of East Fork irrigation district canal near Mount Hood, Oreg., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Apr.	May.	June.	July.	Aug.	Sept.
1	32	26	24	.....	0	40	41	76	58
2	32	18	24	.....	29	41	41	76	58
3	32	18	24	.....	26	41	44	72	58
4	30	18	24	.....	26	40	42	72	58
5	30	24	24	.....	26	38	44	0	58
6	29	20	24	.....	26	38	41	38	58
7	29	29	24	.....	26	38	44	65	58
8	11	26	24	.....	26	38	51	65	58
9	7	29	24	.....	26	38	58	68	58
10	7	26	24	.....	26	41	58	68	58
11	7	26	24	.....	26	41	58	68	51
12	7	24	23	.....	26	44	62	0	46
13	8	24	23	.....	28	44	65	0	44
14	13	24	23	.....	29	44	65	68	44
15	18	0	23	.....	29	44	65	68	42
16	18	24	23	.....	29	44	65	65	30
17	20	24	23	.....	29	44	65	65	26
18	20	24	23	.....	29	48	68	62	24
19	20	24	23	.....	29	48	72	58	24
20	20	24	22	.....	29	48	68	58	23
21	20	24	22	.....	12	44	65	58	22
22	20	28	22	.....	41	42	65	58	20
23	20	30	22	.....	0	42	65	58	20
24	20	29	9	.....	38	48	65	58	20
25	22	29	9	.....	40	44	72	58	20
26	20	26	9	3	38	44	72	58	20
27	20	26	9	0	38	44	72	58	22
28	20	26	9	0	38	44	72	58	20
29	20	26	9	0	38	44	72	58	20
30	20	26	9	16	38	41	72	58	20
31	26	.....	9	.....	38	.....	72	58	.....

NOTE.—Discharge determined from a well-defined rating curve.

Monthly discharge of East Fork irrigation district canal near Mount Hood, Oreg., for the year ending Sept. 30, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	32	7	19.9	1,220	A.
November	30	0	24.1	1,430	A.
December	24	9	19.6	1,210	A.
January			0	0	
February			0	0	
March			0	0	
April	16	0	.6	36	C.
May	41	0	28.4	1,750	A.
June	48	38	42.6	2,530	A.
July	72	41	60.7	3,730	A.
August	76	0	56.5	3,470	A.
September	58	20	37.9	2,260	A.
The year	76	0	24.4	17,600	

WEST FORK OF HOOD RIVER NEAR DEE, OREG.

LOCATION.—In the SW. ¼ sec. 1, T. 1 N., R. 9 E., about 500 feet below an old bridge and about 1 mile from mouth.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 26, 1913, to September 30, 1914.

GAGE.—Vertical staff on right bank attached to stump.

DISCHARGE MEASUREMENTS.—Made by wading at low stages; no equipment for high-water measurement.

CHANNEL AND CONTROL.—Rocky; probably permanent.

EXTREMES OF STAGE.—Maximum stage recorded during year, 4.0 feet at 6 p. m. January 5; minimum stage recorded, 1.15 feet September 1–6.

The following discharge measurement was made by H. J. Dean:
September 8, 1914, gage height, 1.18 feet; discharge, 158 second-feet.
Estimates withheld for additional data.

Daily gage height, in feet, of West Fork of Hood River near Dee, Oreg., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.26	1.45	1.98	1.48	1.99	3.20	1.76	1.85	1.66	1.48	1.30	1.15
2	1.25	1.38	1.82	1.49	1.92	2.74	1.75	1.92	1.71	1.48	1.29	1.15
3	1.25	1.38	1.78	1.50	1.86	2.50	1.83	2.00	1.68	1.48	1.30	1.16
4	1.25	1.36	1.72	2.00	1.85	2.68	1.88	1.95	1.64	1.48	1.29	1.16
5	1.26	1.50	1.65	3.92	1.80	2.60	2.10	1.85	1.61	1.14	1.28	1.15
6	1.31	2.15	1.60	3.32	1.75	2.72	2.05	1.84	1.60	1.42	1.28	1.15
7	2.18	1.95	1.60	3.60	1.70	2.70	2.00	1.84	1.74	1.42	1.29	1.19
8	1.64	1.85	1.58	3.02	1.70	2.69	2.06	1.91	1.78	1.42	1.28	1.19
9	1.68	1.76	1.55	2.52	1.65	2.60	2.00	1.98	1.74	1.41	1.26	1.22
10	1.70	1.74	1.52	2.25	1.64	2.42	2.74	1.90	1.72	1.41	1.25	1.15
11	1.85	1.64	1.56	2.02	1.64	2.15	2.50	1.85	1.66	1.42	1.25	1.18
12	1.62	1.60	1.58	1.95	1.72	2.08	2.20	1.88	1.65	1.44	1.26	1.25
13	1.80	1.58	1.52	1.88	1.71	2.15	2.66	1.93	1.65	1.42	1.26	1.20
14	1.86	1.52	1.55	1.84	1.68	2.22	2.53	1.98	1.60	1.39	1.26	1.40
15	1.92	1.50	1.54	1.82	1.66	2.85	3.00	1.95	1.59	1.40	1.28	1.69
16	1.79	1.51	1.52	1.82	1.65	2.90	2.68	1.88	1.58	1.39	1.26	1.50
17	1.69	1.54	1.50	1.78	1.60	2.78	2.36	1.84	1.56	1.36	1.21	1.55
18	1.60	1.51	1.50	1.74	1.59	2.65	2.20	1.76	1.54	1.40	1.21	1.48
19	1.58	1.55	1.49	1.69	1.58	2.55	2.45	1.75	1.51	1.38	1.20	1.60
20	1.52	1.55	1.48	1.66	1.58	2.45	2.42	1.72	1.50	1.38	1.20	1.62
21	1.51	1.56	1.45	2.22	1.62	2.30	2.13	1.76	1.54	1.31	1.21	1.49
22	1.49	1.58	1.48	3.15	1.82	2.05	2.02	1.80	1.51	1.30	1.22	1.44
23	1.46	2.95	1.44	3.45	1.80	2.05	1.95	1.80	1.50	1.30	1.20	1.40
24	1.48	2.46	1.40	2.85	2.40	2.08	1.92	1.81	1.52	1.30	1.19	1.36
25	1.42	2.12	1.44	2.68	2.48	1.98	1.90	1.82	1.52	1.30	1.19	1.34
26	1.41	2.02	1.45	2.50	2.10	1.95	1.92	1.76	1.51	1.30	1.20	1.35
27	1.38	1.98	1.42	2.18	2.99	1.85	1.88	1.80	1.50	1.30	1.20	1.39
28	1.36	1.85	1.45	2.00	2.90	1.78	1.82	1.76	1.50	1.29	1.19	1.32
29	1.36	1.95	1.41	1.95	.....	1.78	1.78	1.70	1.49	1.29	1.20	1.31
30	1.34	2.02	1.41	1.98	.....	1.78	1.78	1.68	1.48	1.29	1.19	1.30
31	1.36	.....	1.48	1.90	.....	1.82	.....	1.68	.....	1.30	1.16	.....

PACIFIC POWER & LIGHT CO.'S TAILRACE NEAR HOOD RIVER, OREG.

LOCATION.—In the SE. ¼ sec. 36, T. 3 N., R. 10 E., just below power house, opposite gage on Hood River.

RECORDS AVAILABLE.—October 1, 1913, to September 30, 1914.

GAGE.—Vertical staff.

DISCHARGE MEASUREMENTS.—Made from footbridge.

CHANNEL AND CONTROL.—Excavated in solid ground; probably permanent.

EXTREMES OF DISCHARGE.—Maximum recorded discharge, 110 second-feet, February 20; minimum recorded discharge, 15 second-feet at various times throughout year.

ACCURACY.—Results good since August 27, 1914, when the gage was established, as readings have been made four times a day. Discharge prior to that date have been computed from the electrical output of the plant as reported by the operator. The relation between output and discharge can be determined only approximately, but the discharge for the tailrace thus determined is better than a flat estimate.

Discharge measurements of Pacific Power & Light Co.'s tailrace near Hood River, Oreg., for the years ending Sept. 30, 1913 and 1914.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
May 22, 1913	Stewart and Nelson	2.04	92.5
Do	do	2.04	90.6
Mar. 19, 1914	Henshaw and Hodges		79.0
Sept. 11, 1914	H. J. Dean	2.10	93.9

Daily discharge, in second-feet, of Pacific Power & Light Co.'s tailrace near Hood River, Oreg., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	97	68	102	80	78	90	85	69	15	92	85	49
2	97	76	98	96	101	91	85	87	15	91	73	49
3	92	68	40	102	99	72	91	65	15	75	90	48
4	92	68	106	80	99	92	73	88	15	15	78	70
5	27	71	108	88	56	93	73	91	15	62	81	95
6	85	49	107	85	75	88	80	86	15	88	94	14
7	68	43	89	99	94	49	79	91	15	91	98	96
8	83	72	106	101	75	27	82	91	15	93	86	86
9	81	88	105	92	97	85	85	85	89	92	68	97
10	86	72	101	83	101	87	87	58	103	92	91	96
11	87	96	105	76	94	86	79	87	101	91	96	80
12	72	96	100	88	97	89	71	91	103	15	97	85
13	86	95	106	85	97	87	81	94	97	89	91	84
14	89	101	71	102	92	83	82	92	15	93	93	90
15	98	102	106	102	78	75	82	90	97	84	85	84
16	98	90	98	96	95	83	78	103	97	82	65	90
17	99	101	82	86	89	82	85	103	103	15	85	85
18	74	102	104	75	89	55	85	97	103	89	95	92
19	27	102	99	82	99	76	15	97	103	15	87	94
20	82	32	100	91	110	78	84	103	103	90	98	32
21	73	102	56	72	109	80	88	97	85	92	96	96
22	76	102	82	80	37	15	90	85	93	91	95	99
23	85	97	89	95	96	78	91	103	103	89	64	99
24	73	99	93	95	95	80	89	15	103	92	97	100
25	96	98	83	74	95	78	88	89	103	94	96	98
26	78	101	76	102	91	80	70	97	103	69	93	94
27	74	90	85	90	91	84	94	97	91	90	93	70
28	71	101	78	92	93	82	92	97	85	68	95	19
29	68	101	86	99	.....	27	82	97	97	91	88	94
30	71	83	79	94	.....	93	87	95	88	88	27	94
31	27	.....	105	94	.....	84	.....	15	.....	88	47	.....

NOTE.—Discharge determined as follows: Oct. 1 to Aug. 28, computed from the daily kilowatt output of the electric plant and a rating curve prepared by plotting the gage readings and simultaneous readings of the watt-meter after the gage was installed; Aug. 29 to Sept. 30, from a fairly well defined rating curve.

Monthly discharge at Pacific Power & Light Co.'s tailrace near Hood River, Oreg., for the year ending Sept. 30, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	99	27	77.8	4,780	C.
November	102	32	85.5	5,090	C.
December	108	40	91.8	5,640	C.
January	102	72	89.5	5,500	C.
February	110	37	90.1	5,000	C.
March	93	15	75.8	4,660	C.
April	94	15	81.1	4,830	C.
May	103	15	85.6	5,260	C.
June	103	15	72.8	4,330	C.
July	94	15	77.6	4,770	C.
August	98	27	84.7	5,210	C.
September	100	14	79.3	4,720	B.
The year	110	14	82.6	59,800	

WHITE SALMON RIVER AT SPLASH DAM NEAR TROUT LAKE, WASH.

LOCATION.—In the NE. ¼ sec. 6, T. 5 N., R. 11 E., at Wind River splash dam, 2½ miles south of Trout Lake, and about 10 miles north of Husum.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 1, 1912, to September 30, 1914.

GAGE.—Vertical staffs in the pond above the dam except June 1 to September 30, 1912, and May 23 to June 28, 1913, during which periods gage readings were made on vertical staff on right bank just below the dam.

DISCHARGE MEASUREMENTS.—Made from a cable 800 feet below the dam.

CHANNEL AND CONTROL.—For the gage above the dam the control is formed by two sharp-crested weirs and an overflow opening; below the dam, rocks and gravel; somewhat shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded June 1, 1912, to September 30, 1914: "Over gage" January 6, 1914 (discharge estimated 2,000 second-feet); minimum stage recorded, 2.00 feet, August 18 and 31, September 1, 3, 4, and 5, 1914 (discharge, 145 second-feet).

DIVERSIONS.—An unmeasured amount of water is diverted for irrigation above the station.

ACCURACY.—Results good.

COOPERATION.—Gage-height record furnished by Northwestern Electric Co.

Discharge measurements of White Salmon River at splash dam near Trout Lake, Wash., for the year ending Sept. 30, 1914.

[Made by P. V. Hodges.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-feet.*
July 3	2.94	309
Sept. 16	2.72	256

Daily discharge, in second feet, of White Salmon River at splash dam near Trout Lake, Wash., for the years ending Sept. 30, 1913 and 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1912-13.												
1	175	205	315	515	295	255	460	635	1,040	635	235	198
2	175	198	295	485	275	255	460	605	1,100	575	255	190
3	175	205	410	705	275	275	435	605	1,200	575	235	335
4	175	212	435	740	275	295	515	605	1,240	575	255	930
5	168	295	360	635	255	295	575	605	1,180	545	255	515
6	160	360	335	605	255	315	515	635	1,120	545	235	360
7	160	360	315	556	220	315	460	775	1,110	545	275	295
8	175	460	295	508	220	335	460	850	1,090	485	275	275
9	175	635	295	460	235	360	460	930	1,060	460	255	275
10	175	775	275	435	235	360	485	1,060	1,040	515	235	255
11	175	740	275	410	220	360	515	1,060	1,020	485	235	255
12	182	930	275	410	235	360	575	1,020	1,010	460	235	235
13	175	1,500	275	385	220	335	575	1,020	1,010	460	220	255
14	182	1,400	255	385	255	335	605	930	1,000	435	212	235
15	182	1,100	255	360	315	315	635	890	914	385	205	235
16	182	970	255	360	360	335	670	890	834	360	205	255
17	190	635	235	335	435	360	670	890	752	360	205	235
18	190	575	360	315	410	360	670	850	752	335	220	235
19	235	605	315	315	360	335	740	850	770	360	205	220
20	235	575	275	295	360	315	740	890	810	335	205	220
21	198	515	255	295	315	295	810	890	890	360	220	235
22	212	485	255	275	295	315	810	930	1,000	360	235	235
23	235	460	255	275	315	295	740	1,040	1,060	360	235	220
24	212	435	255	275	275	295	705	1,040	1,040	360	235	212
25	315	410	235	410	295	255	740	1,040	965	385	235	205
26	315	385	235	410	295	275	810	1,020	914	335	220	205
27	255	360	235	360	275	275	810	1,060	914	295	220	205
28	235	335	235	335	275	335	705	1,060	834	275	212	212
29	235	335	275	315	.....	485	670	1,040	635	255	235	205
30	220	295	775	295	.....	575	635	1,040	635	235	220	198
31	212	.....	670	295	.....	515	.....	1,040	.....	235	205	.....
1913-14.												
1	205	212	460	235	460	740	515	775	635	315	168	152
2	205	205	435	275	435	705	545	930	670	315	168	152
3	198	198	410	275	410	635	575	1,050	635	315	175	152
4	198	205	385	460	410	605	670	1,010	575	315	168	152
5	198	235	360	1,590	410	575	810	930	515	275	168	152
6	205	385	335	2,000	360	575	810	890	515	255	175	152
7	235	360	335	1,800	385	575	775	890	515	255	175	160
8	235	360	315	1,800	360	605	775	890	515	255	190	152
9	235	315	315	1,540	360	635	850	890	515	255	182	160
10	235	315	295	1,010	360	605	970	890	460	235	175	152
11	275	295	295	850	335	575	1,010	890	435	255	182	160
12	255	275	335	740	335	575	1,050	930	435	275	190	168
13	315	255	315	705	315	605	1,090	930	460	295	175	168
14	295	235	295	670	315	635	1,210	1,010	460	275	175	205
15	275	235	295	635	295	740	1,540	1,090	460	275	168	275
16	275	255	275	605	295	810	1,490	1,090	435	255	168	255
17	235	410	275	575	295	890	1,210	1,010	435	235	152	315
18	235	410	275	545	295	890	1,090	930	410	220	152	295
19	235	360	255	515	295	930	1,130	890	385	220	168	360
20	235	315	255	485	275	930	1,250	850	360	220	160	335
21	220	295	235	515	360	930	1,130	850	335	190	168	275
22	220	315	235	705	410	850	1,010	890	335	190	175	220
23	212	460	235	705	385	850	970	850	315	198	168	205
24	220	635	235	635	410	810	930	810	435	182	168	205
25	212	515	235	635	460	740	890	810	435	168	160	205
26	205	515	235	605	410	705	890	775	360	175	168	220
27	205	740	235	575	575	670	850	740	335	175	168	235
28	198	635	235	515	635	635	775	670	335	168	168	212
29	198	575	235	485	.....	605	740	605	315	160	168	205
30	190	515	220	515	.....	575	740	605	315	175	160	198
31	190	.....	235	485	.....	575	.....	605	.....	168	152	.....

NOTE.—Discharge determined from a rating curve well defined between 150 and 800 second-feet except May 10–13, and May 23–June 28, 1913, which was determined from gage readings below the dam and two fairly well defined rating curves applicable May 10 to June 3 and June 4 to June 28. Water over top of gage Nov. 13–15, 1912, May 10–13, 1913, and Jan. 6–8, 1914; discharge estimated from White Salmon River at Husum. Discharge interpolated owing to lack of gage reading Jan. 7 and 8, 1913.

Monthly discharge of White Salmon River at splash dam near Trout Lake, Wash., for the years ending Sept. 30, 1913 and 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
1912–13.					
October	315	160	203	12,500	A.
November	a 1,500	198	558	33,200	B.
December	775	235	316	19,400	A.
January	740	275	411	25,300	A.
February	435	220	288	16,000	A.
March	575	255	335	20,600	A.
April	810	435	622	37,000	A.
May	1,060	605	897	55,200	B.
June	1,240	635	965	57,400	B.
July	635	235	416	25,600	A.
August	275	205	230	14,100	A.
September	930	190	271	16,100	A.
The year	a 1,500	160	459	332,000	
1913–14.					
October	315	190	227	14,000	A.
November	740	198	368	21,900	A.
December	460	220	293	18,000	A.
January	a 2,000	235	764	47,000	B.
February	635	275	380	21,000	A.
March	930	575	703	43,200	A.
April	1,540	515	943	56,100	A.
May	1,090	605	870	53,500	A.
June	670	315	445	26,500	A.
July	315	160	234	14,400	A.
August	190	152	170	10,500	A.
September	335	152	208	12,400	A.
The year	a 2,000	152	468	339,000	

a Estimated from records at Husum.

WHITE SALMON RIVER AT HUSUM, WASH.

LOCALITY.—In the SE. ¼ sec. 25, T. 4 N., R. 10 E., 1,000 feet above falls and powerhouse at Husum and three-eighths mile above Rattlesnake Creek.

DRAINAGE AREA.—300 square miles.

RECORDS AVAILABLE.—September 23, 1909, to September 30, 1914.

GAGE.—Vertical staff.

DISCHARGE MEASUREMENTS.—Made from cable 100 feet below gage.

CHANNEL AND CONTROL.—Gravel and lava boulders; practically permanent. Control is crest of falls, which is sometimes obstructed by logs, causing backwater.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.32 feet January 6 (discharge, 2,370 feet); minimum stage recorded, 2.99 feet December 21; (discharge, 580 second-feet).

DIVERSIONS.—Several ditches divert water for irrigation in Trout Lake Valley.

REGULATION.—None,

ACCURACY.—Results good. Practically no backwater at gage in 1914.

Discharge measurements of White Salmon River at Husum, Wash., for the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 11	E. S. Fuller	3.20	663	July 4	P. V. Hodges	3.80	1,010
Jan. 6	F. F. Henshaw	6.32	2,360	Sept. 15	....do	3.30	745
Mar. 20	P. V. Hodges	4.65	1,370				

Daily discharge, in second-feet, of White Salmon River at Husum, Wash., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	675	630	870	630	1,070	1,380	1,120	1,380	1,220	970	770	675
2	675	585	820	700	1,070	1,380	1,120	1,380	1,270	970	770	675
3	675	585	770	920	1,020	1,270	1,170	1,490	1,220	970	770	657
4	675	585	770	1,880	970	1,270	1,170	1,490	1,170	970	770	675
5	675	630	745	2,300	970	1,220	1,270	1,440	1,170	970	770	675
6	675	720	720	2,360	870	1,170	1,320	1,380	1,120	920	770	675
7	720	720	698	2,360	870	1,220	1,320	1,380	1,120	920	770	675
8	675	720	675	1,940	870	1,220	1,320	1,380	1,120	920	770	675
9	675	720	675	1,600	870	1,220	1,380	1,380	1,120	920	720	630
10	675	720	675	1,380	870	1,220	1,490	1,380	1,070	870	720	630
11	675	680	675	1,220	870	1,220	1,490	1,380	1,070	870	720	630
12	675	660	675	1,120	820	1,220	1,490	1,380	1,070	920	720	630
13	770	640	675	1,070	845	1,170	1,600	1,410	1,070	920	720	630
14	720	620	675	1,070	870	1,170	1,760	1,440	1,070	920	720	630
15	720	620	675	1,020	870	1,270	1,820	1,460	1,070	920	720	675
16	675	640	630	1,020	880	1,270	1,710	1,490	1,070	870	720	675
17	675	790	630	1,020	890	1,320	1,600	1,490	1,070	870	720	675
18	630	790	585	970	900	1,380	1,540	1,440	1,070	870	675	720
19	630	740	585	920	910	1,380	1,540	1,380	1,020	870	720	770
20	630	700	585	920	920	1,440	1,600	1,380	970	870	720	770
21	585	680	585	920	920	1,380	1,600	1,380	970	820	720	770
22	596	700	585	1,170	920	1,380	1,490	1,380	970	820	675	720
23	607	840	585	1,320	970	1,320	1,440	1,380	1,070	820	675	675
24	618	1,020	585	1,270	1,020	1,270	1,380	1,380	1,070	820	675	675
25	630	900	585	1,170	1,070	1,270	1,380	1,320	1,070	770	675	675
26	630	900	585	1,170	1,070	1,220	1,380	1,270	1,020	770	675	675
27	630	1,070	630	1,170	1,170	1,200	1,380	1,270	970	770	675	675
28	630	1,020	630	1,070	1,220	1,170	1,380	1,270	970	770	675	675
29	630	970	630	1,070	.....	1,170	1,380	1,220	970	770	675	675
30	585	920	630	1,070	.....	1,120	1,380	1,170	970	770	675	675
31	585	.....	630	1,070	.....	1,120	.....	1,220	.....	770	675	.....

NOTE.—Discharge determined from a rating curve well defined below 1,500 second-feet and fairly well defined between 1,500 and 2,500 second-feet. Discharge interpolated for lack of gage-height record, Oct. 22–24; Dec. 1, 2, 5, 7, 9, and 10; Feb. 13 and 16–19; Apr. 26 to May 1; July 26–28 and 31; Aug. 2, 3, 13, 16, and Sept. 3. Discharge Nov. 11–26 obtained, for lack of gage-height record, by adding 380 second-feet to the recorded discharge at the Trout Lake station. Discharge Dec. 28 to Jan. 2 estimated, for lack of gage-height record, from the Trout Lake station.

Monthly discharge of White Salmon River at Husum, Wash., for the year ending Sept. 30, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	770	585	656	40,300	B.
November	1,070	585	750	44,600	C.
December	870	585	660	40,600	B.
January	2,360	630	1,250	76,900	B.
February	1,220	820	949	52,700	B.
March	1,440	1,120	1,260	77,500	B.
April	1,820	1,120	1,430	85,100	B.
May	1,490	1,170	1,370	84,200	B.
June	1,270	970	1,070	63,700	B.
July	970	770	870	53,500	B.
August	770	675	717	44,100	B.
September	770	630	678	40,300	B.
The year	2,360	585	973	704,000	

SANDY RIVER ABOVE SALMON RIVER, AT BRIGHTWOOD, OREG.

LOCATION.—In sec. 24, T. 2 S., R. 6 E. at McIntyre's bridge just back of the post office at Brightwood and three-fourths mile above Salmon River.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 17, 1910, to December 31, 1912; March 1 to September 30, 1914, when station was discontinued.

GAGE.—Vertical staff.

DISCHARGE MEASUREMENTS.—Made from the bridge.

CHANNEL AND CONTROL.—Rocks, sand, and gravel; somewhat shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.1 feet at 9 a. m. January 5 (discharge, 2,750 second-feet); minimum stage recorded, 0.70 foot September 1–6 (discharge, 235 second-feet).

ACCURACY.—Results good.

Discharge measurements of Sandy River above Salmon River, at Brightwood, Oreg., during the year 1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 29	R. R. Randell	2.03	776	Nov. 7	P. V. Hodges	2.02	752
Aug. 25	H. J. Dean	.78	264	10	do	1.70	555

Daily discharge, in second-feet, of Sandy River above Salmon River, at Brightwood, Oreg., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	253	420	870	480	740	1,910	600	870	480	502	335	235
2	253	365	740	550	680	1,520	710	870	525	480	335	235
3	253	335	740	740	625	1,260	940	940	525	480	335	253
4	244	335	680	1,180	680	1,340	1,180	800	525	525	320	352
5	244	400	575	2,620	625	1,710	1,180	740	525	480	320	235
6	300	1,020	575	1,710	575	1,710	1,100	740	600	480	305	235
7	1,710	870	525	1,810	525	1,520	1,020	740	710	440	305	245
8	870	740	502	1,520	502	1,520	940	740	800	440	305	268
9	870	710	480	1,260	480	1,340	1,020	800	870	420	305	280
10	870	710	440	1,020	550	1,180	1,520	680	740	400	280	255
11	1,100	625	440	940	800	1,100	1,430	680	740	400	280	255
12	870	525	440	800	870	1,100	1,180	680	680	400	280	255
13	870	480	440	740	870	1,180	1,340	680	625	400	305	245
14	800	480	460	680	800	1,180	1,180	710	575	400	292	382
15	1,020	440	440	652	740	1,520	1,520	680	575	400	292	740
16	940	440	440	625	680	1,430	1,430	625	575	400	280	480
17	740	440	400	600	625	1,340	1,260	625	550	400	280	525
18	680	420	400	575	575	1,260	1,180	575	550	400	255	502
19	625	440	365	525	575	1,180	1,260	525	480	382	255	525
20	575	460	365	502	550	1,100	1,260	525	480	365	268	652
21	502	460	365	1,260	575	1,020	1,100	525	480	365	280	502
22	440	870	365	1,710	740	1,020	1,020	550	480	335	280	420
23	440	1,710	350	1,910	680	870	940	575	480	335	280	400
24	480	1,340	335	1,520	1,340	800	870	525	525	335	255	365
25	440	1,020	335	1,340	1,340	800	800	550	575	335	255	350
26	400	940	350	1,180	1,020	740	800	550	525	320	268	400
27	400	870	335	1,020	2,130	680	800	575	502	320	280	335
28	365	870	335	870	1,710	625	740	525	480	320	280	305
29	365	940	335	800	.....	625	740	480	502	320	255	292
30	350	940	335	740	.....	625	740	480	502	335	255	305
31	350	.....	525	740	.....	625	.....	480	.....	335	255	.....

NOTE.—Discharge determined from a rating curve well defined between 250 and 1,000 second-feet and fairly well defined at higher stages.

Monthly discharge of Sandy River above Salmon River, at Brightwood, Oreg., for the year ending Sept. 30, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	1,710	244	601	37,000	A.
November	1,710	335	687	40,900	A.
December	870	335	461	28,300	A.
January	2,620	480	1,050	64,600	A.
February	2,130	480	807	44,800	A.
March	1,910	625	1,160	71,300	A.
April	1,520	600	1,060	63,100	A.
May	940	480	646	39,700	A.
June	870	480	573	34,100	A.
July	525	320	395	24,300	A.
August	335	255	286	17,600	B.
September	740	235	356	21,200	B.
The year	2,620	235	672	487,000	

SANDY RIVER NEAR MARMOT, OREG.

LOCATION.—In sec. 24, T. 2 S., R. 5 E., at the Van der Hoof ranch, about 1½ miles above Marmot and about 5 miles below Brightwood.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 15, 1911, to September 30, 1914.

GAGE.—A Friez water-stage recorder referred to a vertical staff on the stilling well.

DISCHARGE MEASUREMENTS.—Made from a cable about a mile below gage.

CHANNEL AND CONTROL.—Rocks and gravel; may shift slightly.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 6.84 feet at 8 a. m. October 7 (discharge, 7,380 second-feet); minimum stage from water-stage recorder, 1.03 feet September 6 (discharge, 329 second-feet).

ACCURACY.—Results good.

Discharge measurements of Sandy River near Marmot, Oreg., during the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 25	F. F. Henshaw	3.30	1,780	July 12	C. L. Batchelder	1.67	598
Jan. 27	R. R. Randell	3.35	1,740	Aug. 28	do	1.14	345
Apr. 16	C. L. Batchelder	4.40	3,060				

Daily discharge, in second-feet, of Sandy River near Marmot, Oreg., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	371	620	1 510	985	1,330	3,580	1,060	1,290	745	670	476	350
2	377	580	1,330	1,090	1,210	2 780	1,210	1,380	745	670	472	350
3	368	560	1,170	1,250	1,060	2,580	1,610	1,460	770	695	488	368
4	365	560	1,020	1,980	1,090	2,640	2,150	1,290	800	645	484	347
5	362	770	950	4 820	1,060	2,640	2,330	1,210	830	600	460	332
6	540	2.040	890	2,500	920	2.850	1,820	1,170	890	580	464	329
7	4,310	1,560	860	2.300	890	3.420	1,660	1,130	1,210	580	444	374
8	1,760	1,250	800	1.800	830	2,920	1,560	1,250	1,380	600	452	380
9	1,660	1 130	745	1.500	800	2,330	1.710	1,290	1,460	560	444	412
10	1.560	1,090	720	1,400	920	1,930	3.060	1,170	1,210	580	440	338
11	1,880	950	695	1,400	1,420	1,710	2,710	1,090	1,060	580	444	347
12	1,380	950	695	1,300	1,710	1,660	2,210	1,060	985	580	448	416
13	1,420	800	670	1,250	1,660	1,820	2,390	1,090	920	620	444	371
14	1,460	745	695	1,170	1,420	2,040	2,270	1,090	860	600	440	540
15	1,660	720	670	1,090	1,250	2,640	3,730	1,020	830	580	432	1,380
16	1,710	720	645	1,020	1,130	2,640	3,130	950	800	560	408	890
17	1,290	720	645	985	1,060	2,390	2,450	920	770	560	368	890
18	1,090	720	645	920	985	2,150	2.100	830	745	560	371	770
19	950	745	600	860	950	2,040	2,390	800	720	560	371	830
20	860	890	580	830	920	1,930	2,580	770	720	520	380	1,060
21	800	830	580	2,210	1,090	1,760	2,450	770	770	476	392	860
22	720	1,380	580	3,810	1,250	1,610	2,330	800	720	460	384	695
23	695	4,400	560	4,220	1,130	1,460	2,210	800	670	468	377	600
24	720	2,990	560	3,200	2,100	1,420	1,710	800	890	464	371	560
25	645	1.760	580	2,390	1,420	1,290	1,560	830	860	460	368	540
26	620	1,510	600	2,150	3,420	1,170	1,420	800	770	460	371	540
27	620	1,460	580	1,760	3,650	1,090	1,330	890	720	460	377	560
28	580	1,380	600	1,510	3,970	1,060	1,290	860	670	460	374	496
29	560	1,660	580	1,330	.....	1,060	1,290	770	670	464	374	484
30	560	1.660	580	1,330	.....	1,060	1,250	720	670	480	371	468
31	560	.....	860	1,290	.....	1,060	.....	720	.....	484	353	.....

NOTE.—Discharge determined from a rating curve well defined from 300 to 5,000 second-feet. Discharge Jan. 6–12 estimated for lack of gage readings, by comparison with record of Sandy River below Bull Run.

Monthly discharge of Sandy River near Marmot, Oreg., for the year ending Sept. 30, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	4,310	362	1,050	64,600	A.
November	4 400	560	1,240	73,800	A.
December	1,510	560	748	46,000	A.
January	4,820	830	1,800	111,000	B.
February	3,970	800	1,450	80,500	A.
March	3,580	1,060	2,020	124,000	A.
April	3,730	1,060	2,030	121,000	A.
May	1,460	720	1,000	61,500	A.
June	1,460	670	862	51,300	A.
July	695	460	550	33,800	A.
August	488	353	414	25,500	A.
September	1,380	329	563	33,500	A.
The year	4,820	329	1,140	826,000	

SANDY RIVER BELOW BULL RUN RIVER, NEAR BULL RUN, OREG.

LOCATION.—In sec. 30, T. 1 S., R. 5 E., about 1,000 feet below mouth of Bull Run River and 1½ miles northwest or Bull Run.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 27, 1910, to February 10, 1912; July 26, 1912, to September 30, 1914, when station was discontinued.

GAGE.—Staff in two sections, the lower section vertical, the upper inclined.

DISCHARGE MEASUREMENTS.—Made from a footbridge just below gage.

CHANNEL AND CONTROL.—Rocks and gravel; may shift slightly.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.7 feet at 7 a. m. January 5 (discharge, 13,100 second-feet); minimum stage from water-stage recorder, 0.15 feet at 8 a. m. September 6 (discharge, 190 second-feet).

REGULATION.—Low-water flow materially affected by storage in the reservoir of the Bull Run power plant of the Portland Railway Light & Power Co.

ACCURACY.—Results excellent.

Discharge measurements of Sandy River below Bull Run River, near Bull Run, Oreg., for the period Sept. 30, 1913, to Nov. 12, 1914.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Aug. 20	C. L. Batchelder	0.88	487
Nov. 12	P. V. Hodges	3.45	3,630

Daily discharge, in second-feet, of Sandy River below Bull Run River, near Bull Run, Oreg., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	450	1,190	3,420	2,370	3,210	7,800	2,080	2,220	1,380	1,170	600	440
2	400	964	2,870	2,700	2,860	5,860	2,220	2,370	1,440	1,070	455	440
3	410	860	2,700	2,530	2,370	4,430	2,860	2,530	1,330	1,020	570	460
4	425	916	2,210	4,960	2,370	5,610	4,000	2,220	1,380	1,020	540	440
5	425	1,070	1,700	12,700	2,220	6,120	4,430	2,080	1,440	970	455	450
6	512	4,250	1,560	7,220	2,080	6,660	3,590	1,940	1,620	830	510	310
7	9,320	3,230	1,500	6,940	1,940	5,360	3,210	1,940	2,220	830	570	360
8	3,420	2,530	1,360	5,860	1,810	4,880	3,030	2,220	2,530	830	480	445
9	3,050	2,290	1,260	4,210	1,740	4,430	2,860	2,370	2,860	790	540	540
10	2,700	2,210	1,180	3,590	1,940	3,590	5,860	1,940	2,220	750	540	460
11	3,420	1,840	1,170	3,210	3,210	3,210	5,120	1,810	2,010	830	480	415
12	2,370	1,560	1,150	3,030	4,000	3,030	4,210	1,810	1,880	670	510	480
13	2,870	1,320	1,150	2,530	3,790	3,400	4,880	1,740	1,810	830	540	492
14	2,700	1,320	1,030	2,530	3,210	4,000	4,430	1,680	1,280	830	430	750
15	3,420	1,190	1,190	2,220	2,530	5,120	7,500	1,740	1,220	750	510	2,370
16	3,230	1,190	1,120	2,220	2,370	4,880	5,860	1,560	1,280	710	405	1,880
17	2,370	1,360	1,150	2,080	2,220	4,000	4,650	1,620	1,120	635	405	1,940
18	2,060	1,290	1,110	2,080	1,940	2,790	4,000	2,080	1,120	790	430	1,500
19	1,550	1,190	1,030	1,810	1,940	3,590	4,210	1,220	1,120	670	480	1,620
20	1,320	1,800	1,020	1,680	1,810	3,210	4,430	1,330	1,120	790	455	2,370
21	1,250	1,560	884	4,880	2,010	3,030	3,590	1,220	1,330	635	450	2,010
22	1,110	1,880	900	8,100	2,370	2,860	3,210	1,330	1,170	480	440	1,330
23	1,020	9,320	868	9,960	2,530	2,690	2,860	1,440	1,070	510	420	1,120
24	1,060	5,690	860	6,940	5,860	2,530	2,690	1,380	1,680	540	465	970
25	940	3,820	940	5,360	5,860	2,370	2,530	1,440	1,440	540	445	830
26	884	3,190	1,110	4,880	4,000	2,220	2,530	1,330	1,440	510	415	875
27	964	3,140	1,120	3,790	10,300	1,940	2,530	1,680	1,280	600	380	1,070
28	900	2,620	1,130	3,210	7,500	1,940	2,530	1,560	1,170	600	415	920
29	785	3,420	1,130	2,690	.....	1,940	2,220	1,380	1,170	540	420	830
30	743	3,420	1,120	2,860	.....	2,080	2,080	1,220	1,120	570	301	710
31	715	.....	1,840	2,860	.....	1,940	.....	1,170	.....	635	440	.....

NOTE.—Discharge determined from a well-defined rating curve. Discharge Aug. 20 to Sept. 14 obtained from water-stage recorder; record for rest of year obtained from the mean of two gage readings each day is somewhat uncertain for low stages on account of regulation at power plant above.

Monthly discharge of Sandy River below Bull Run River, near Bull Run, Oreg., for the year ending Sept. 30, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	9,320	400	1,830	113,000	A.
November	9,320	860	2,390	142,000	A.
December	3,420	860	1,380	84,800	A.
January	12,700	1,680	4,260	262,000	A.
February	10,300	1,740	3,210	178,000	A.
March	7,800	1,940	3,820	235,000	A.
April	7,500	2,080	3,670	218,000	A.
May	2,530	1,170	1,730	106,000	A.
June	2,860	1,070	1,510	89,800	A.
July	1,170	480	740	45,500	B.
August	600	301	468	28,800	B.
September	2,370	310	961	57,200	A.
The year	12,700	301	2,160	1,560,000	

CLEAR FORK OF SANDY RIVER NEAR WELCHES, OREG.

LOCATION.—In the SW. ¼ sec. 19, T. 2 S., R. 8 E., 100 yards below Clear Fork ranger cabin, about half a mile above mouth of stream and about 7 miles northeast of Welches.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 15 to October 15, 1913, and July 18 to September 18, 1914.

GAGE.—Vertical staff.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Gravel and boulders; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded July 18 to September 18, 0.90 foot September 18 (discharge, 47 second-feet); minimum stage recorded, 0.20 foot, September 2 and 4 (discharge, 6 second-feet).

Discharge measurements of Clear Fork of Sandy River near Welches, Oreg., for the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Jan. 20	R. R. Randell	0.89	46
Aug. 27	H. J. Dean	.23	7.6

Daily discharge, in second-feet, of Clear Fork of Sandy River near Welches, Oreg., for the year ending Sept. 30, 1914.

Oct. 1	10	July 21	12	Aug. 12	7	Sept. 2	6
5	9	25	11	15	7	4	6
7	142	28	10	17	7	9	14
11	77	31	8	21	7	12	19
15	72	Aug. 4	8	25	7	16	34
July 18	12	7	8	28	7	18	47

NOTE.—Discharge determined from a rating curve well defined below 75 second-feet.

LOST CREEK NEAR BRIGHTWOOD, OREG.

LOCATION.—In the NE. ¼ sec. 25, T. 2 S., R. 7 E.; about 100 yards above mouth, 1 mile southeast of Trumans ranch, about 8 miles east of Brightwood.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 17, 1913, to September 30, 1914.

GAGE.—Stevens water-stage recorder.

DISCHARGE MEASUREMENTS.—Made from foot log or by wading.

CHANNEL AND CONTROL.—Gravel and bowlders; may shift in floods.

EXTREMES OF DISCHARGE.—Maximum stage from water-stage recorder, 2.46 feet at 10 a. m January 5 (discharge, 495 second-feet), minimum stage from water-stage recorder, 0.40 foot August 24 to September 2 (discharge, 15 second-feet).

ACCURACY.—Results excellent except for extreme by high water.

Discharge measurements of Lost Creek near Brightwood, Oreg., for the period Sept. 17, 1913, to Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Sept. 17	R. R. Randell	0.51	18.6	Aug. 27	H. J. Dean	0.41	15.3
Jan. 31	do	1.07	59.6				

Daily discharge, in second-feet, of Lost Creek near Brightwood, Oreg., for the period Sept. 17, 1913, to Sept. 30, 1914.

Day.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		18	37	84	49	61	295	50	75	56	37	19	15
2		18	33	74	77	54	171	74	89	49	36	19	15
3		18	32	66	96	50	131	106	98	48	35	19	15
4		18	32	57	244	51	142	158	80	48	33	18	15
5		18	60	51	438	49	182	158	74	47	32	18	16
6		36	133	48	234	46	208	116	72	53	32	18	16
7		258	112	46	158	45	168	104	72	77	31	18	17
8		116	91	43	122	41	150	98	78	100	31	18	20
9		106	78	40	114	39	127	112	85	98	30	18	19
10		122	75	39	102	50	108	182	77	80	30	18	16
11		142	64	39	87	75	104	152	70	70	29	17	17
12		102	56	39	75	80	108	129	74	69	28	17	20
13		94	50	38	67	80	122	152	80	64	27	17	18
14		89	46	37	61	70	131	148	84	57	26	17	32
15		110	43	37	56	61	179	215	77	57	26	16	64
16		106	41	36	51	56	173	155	72	51	25	16	53
17	19	87	42	36	50	50	140	122	60	48	24	17	54
18	19	77	39	36	48	48	116	114	57	46	24	17	47
19	19	69	42	34	46	48	106	136	51	43	23	16	54
20	18	60	44	32	44	47	98	136	53	42	22	16	72
21	21	54	41	32	176	69	89	110	56	42	22	16	54
22	24	47	72	32	231	78	84	100	57	39	21	16	43
23	20	44	231	32	193	75	80	96	57	39	21	15	37
24	20	46	160	32	131	187	74	85	54	57	21	15	33
25	18	41	114	32	112	165	66	80	56	53	21	15	31
26	18	39	96	32	104	114	60	77	50	48	20	15	32
27	18	39	93	31	85	335	56	78	60	45	20	15	33
28	19	36	84	32	75	262	54	74	56	41	20	15	29
29	20	34	100	31	67	.....	53	70	50	39	20	15	28
30	19	33	91	31	63	.....	50	70	50	39	19	15	27
31	.....	34	.....	57	61	.....	50	.....	51	.....	19	15	.....

NOTE.—Discharge determined from a rating curve well defined between 15 and 150 second-feet; above this the curve is an extension and subject to error. Discharge, owing to lack of gage readings, interpolated July 5–13.

Monthly discharge of Lost Creek near Brightwood, Oreg., for the year ending Sept. 30, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	258	18	68.1	4,190	A.
November	231	32	74.4	4,430	A.
December	84	31	41.5	2,550	A.
January	438	44	113	6,950	B.
February	335	39	85.2	4,730	A.
March	295	50	119	7,320	A.
April	215	50	115	6,840	A.
May	98	50	66.9	4,110	A.
June	100	39	54.8	3,260	A.
July	37	19	26.0	1,600	A.
August	19	15	16.6	1,020	A.
September	72	15	31.4	1,870	A.
The year	438	15	67.5	48,900	

NOTE.—Mean discharge Sept. 17–30, 1913, 19.4 second-feet; run-off, 539 acre-feet.

SALMON RIVER AT WELCHES, OREG.

LOCATION.—In the NW. ¼ sec. 9, T. 3 S., R. 7 E., at highway bridge about 100 yards above Welches Hotel, and 5 miles above mouth of stream.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 15, 1913, to September 30, 1914, when station was discontinued.

GAGE.—Vertical staff on right abutment of bridge.

DISCHARGE MEASUREMENTS.—Made by wading or from the bridge.

CHANNEL AND CONTROL.—Gravel and small boulders; likely to shift in high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.8 feet at 8 a. m. October 7 (discharge, 3,160 second-feet); minimum stage recorded, 0.24 foot August 23 to September 6 (discharge, 90 second-feet).

ACCURACY.—Results good.

Discharge measurements of Salmon River at Welches, Oreg., for the period Oct. 1, 1913, to Mar. 31, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-feet.*
Feb. 2, 1914	R. R. Randell	1.09	396
Aug. 26, 1914	H. J. Dean	.24	89.5
Nov. 8, 1914	P. V. Hodges	.97	327
Mar. 31, 1915	Batchelder and Kelley	1.43	601

Daily discharge, in second-feet, of Salmon River at Welches, Oreg., for the period Aug. 15, 1913, to Sept. 30, 1914.

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	130	104	160	450	395	450	890	510	450	220	190	130	90
2	.....	130	104	160	395	510	395	810	580	450	220	160	130	90
3	.....	160	104	160	345	650	395	650	580	450	220	160	104	90
4	.....	196	104	130	300	650	395	650	650	450	220	160	104	90
5	.....	175	104	190	260	1,930	345	650	730	450	260	160	104	90
6	.....	151	104	1,080	260	1,180	345	580	650	395	345	160	103	90
7	.....	130	3,160	580	260	1,080	345	580	650	395	395	160	103	94
8	.....	130	2,170	450	260	1,380	300	650	730	395	345	160	102	107
9	.....	130	580	395	220	1,080	345	730	810	510	345	160	102	99
10	.....	130	450	345	220	650	395	810	1,820	450	300	160	101	94
11	.....	117	395	300	220	580	450	810	1,080	450	300	160	100	94
12	.....	117	395	300	220	450	510	810	890	450	260	160	99	94
13	.....	117	345	260	220	450	450	730	890	395	220	160	98	148
14	.....	117	395	220	220	395	395	650	810	395	220	160	97	178
15	154	117	510	220	220	345	395	810	810	395	220	130	96	858
16	154	117	510	220	220	300	345	1,080	890	395	220	130	95	486
17	154	117	450	220	220	300	300	980	980	345	220	130	94	300
18	154	117	345	220	220	300	300	890	730	345	220	130	93	300
19	145	117	260	190	220	300	300	810	730	300	220	130	92	300
20	145	104	260	220	190	345	300	730	890	300	190	130	92	345
21	145	104	220	260	190	450	260	730	810	260	190	130	91	300
22	145	104	220	300	190	650	345	650	730	260	190	130	91	260
23	145	104	190	890	190	1,080	450	650	650	260	190	130	90	260
24	145	104	190	810	190	1,080	890	580	650	260	220	130	90	220
25	145	104	190	510	190	1,180	1,280	510	510	260	220	130	90	220
26	145	104	190	450	190	1,080	1,080	450	510	220	190	130	90	220
27	136	104	190	395	190	890	1,600	450	510	220	190	130	90	190
28	130	104	190	395	190	450	980	450	510	220	190	130	90	160
29	130	104	160	580	220	450	.....	450	450	220	190	130	90	160
30	130	104	160	510	300	450	.....	395	450	220	190	130	90	130
31	130	.....	160	.....	300	450	.....	395	.....	220	.....	130	90	.....

NOTE.—Discharge determined from a rating curve well defined between 80 and 1,000 second-feet. Discharge interpolated Aug. 6–22, 1914, as observer did not read gage correctly for this period.

Monthly discharge of Salmon River at Welches, Oreg., from Aug. 15, 1913, to Sept. 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
1913.					
August 15–31	154	130	143	4,820	A.
September	196	104	122	7,260	A.
1913–14.					
October	3,160	104	416	25,600	C.
November	1,080	130	371	22,100	B.
December	450	190	241	14,800	B.
January	1,930	300	693	42,600	B.
February	1,600	260	512	28,400	B.
March	1,080	395	678	41,700	B.
April	1,820	450	740	44,000	B.
May	510	220	348	21,400	B.
June	395	190	237	14,100	B.
July	190	130	145	8,920	B.
August	130	90	97.8	6,010	B.
September	858	90	205	12,200	A.
The year	3,160	90	389	282,000	

BULL RUN RIVER NEAR BULL RUN, OREG.

LOCATION.—In sec. 25, T. 1 S., R. 5 E., 1¼ miles above intake of Portland water-supply pipe line, and 5 miles east of Bull Run.

DRAINAGE AREA.—102 square miles.

RECORDS AVAILABLE.—August 20, 1907, to September 30, 1914.

GAGE.—Friez water-stage recorder referred to vertical staff. Prior to July 28, 1909, an inclined staff at headworks 1¼ miles below present gage.

DISCHARGE MEASUREMENTS.—Made from cable at gage or by wading near gage.

CHANNEL AND CONTROL.—Rocks and gravel; shifting in extreme floods.

EXTREMES OF DISCHARGE.—Maximum stage from water-stage recorder, 8.80 feet at 9 a. m. January 5 (discharge, 6,280 second-feet); minimum stage from water-stage recorder, 2.54 feet August 29 to September 4 (discharge, 72 second-feet).

ACCURACY.—Results good.

The following measurement was made by H. J. Dean:

September 3, 1914, gage height, 2.54 feet; discharge, 70.5 second-feet.

Daily discharge, in second-feet, of Bull Run River near Bull Run, Oreg., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	132	290	1,240	274	1,040	2,480	588	535	334	260	100	72
2	120	326	1,190	355	1,110	2,000	650	535	311	240	102	72
3	120	288	910	454	853	1,510	865	525	346	221	100	72
4	132	326	734	2,540	723	2,000	1,240	525	355	209	100	72
5	126	551	616	5,230	751	2,000	1,150	525	398	200	100	74
6	299	1,540	535	2,480	728	2,230	878	525	435	191	97	74
7	2,800	1,150	473	2,300	577	1,600	745	520	577	182	97	92
8	1,640	878	478	1,680	515	1,500	734	530	751	173	92	137
9	1,280	805	420	1,190	473	1,260	965	473	853	164	94	161
10	1,110	805	376	1,070	633	985	1,680	435	672	155	94	97
11	1,360	655	342	965	1,280	810	1,640	398	567	155	92	94
12	1,000	561	346	829	1,320	760	1,240	407	525	152	92	110
13	1,360	483	346	757	1,360	985	1,640	389	473	167	90	94
14	1,360	425	355	706	1,070	1,050	1,640	384	416	158	87	230
15	1,460	380	394	706	865	1,540	2,480	367	380	149	84	829
16	1,150	407	346	700	805	1,460	1,680	346	346	146	82	599
17	891	478	350	683	633	1,150	1,190	311	326	146	82	661
18	711	459	342	616	583	1,000	1,000	292	299	140	82	530
19	588	509	326	546	530	965	1,190	277	281	137	82	667
20	494	616	307	535	504	910	1,070	263	274	134	82	841
21	430	551	295	2,240	588	829	884	256	355	132	82	583
22	380	1,150	292	3,320	793	728	763	256	303	126	82	483
23	346	3,330	281	4,270	829	689	706	274	295	123	84	363
24	355	2,360	267	2,750	1,540	689	661	338	435	120	82	326
25	307	1,320	267	1,690	2,180	622	633	380	435	112	77	307
26	300	1,040	326	1,680	1,360	594	611	346	398	112	77	372
27	275	1,000	338	1,360	2,240	556	633	541	350	110	77	407
28	275	930	295	1,040	2,240	551	583	499	338	107	74	299
29	250	1,260	281	823	.....	551	546	435	315	104	72	263
30	250	1,510	263	757	.....	577	520	380	288	102	72	240
31	250	.....	250	891	.....	594	.....	355	.....	100	72	.....

NOTE.—Discharge determined from a well-defined rating curve except Oct. 26 to Nov. 1, Jan. 22–25, Mar. 2–7 and 9–14, for which periods no gage records were available at the regular station, discharge was determined from gage heights at headworks applied to a fairly well-defined rating curve.

Monthly discharge of Bull Run River near Bull Run, Oreg., for the year ending Sept. 30, 1914.

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
October	2,800	120	695	6.81	7.85	42,700	B.
November	3,330	288	879	8.62	9.62	52,300	B.
December	1,240	250	438	4.29	4.95	26,900	A.
January	5,230	274	1,470	14.40	16.60	90,400	B.
February	2,240	473	1,000	9.80	10.20	55,500	A.
March	2,480	551	1,130	11.10	12.80	69,500	B.
April	2,480	520	1,030	10.10	11.27	61,300	A.
May	541	256	407	3.99	4.60	25,000	A.
June	853	274	414	4.06	4.53	24,600	A.
July	260	100	152	1.49	1.72	9,350	B.
August	102	72	86.5	.849	.98	5,320	B.
September	841	72	307	3.01	3.36	18,300	B.
The year	5,230	72	665	6.52	88.48	481,000	

LITTLE SANDY RIVER NEAR MARMOT, OREG.

LOCATION.—In the SW. ¼ sec. 6, T. 2 S., R. 6 E., at trail bridge at Little Sandy ranger station, 1½ miles north of Marmot.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 14, 1913, to September 30, 1914.

GAGE.—Stevens water-stage recorder, referred to vertical staff.

DISCHARGE MEASUREMENTS.—Made by wading or from trail bridge.

CHANNEL AND CONTROL.—Gravel and boulders; may shift somewhat.

EXTREMES OF DISCHARGE.—Maximum stage from water-stage recorder, 3.22 feet at 10 a. m. January 5 (discharge, 934 second-feet); minimum stage recorded, 0.21 foot August 28 (discharge, 12 second-feet).

ACCURACY.—Results good.

COOPERATION.—Gage-height record furnished by United States Forest Service, T. H. Sherrard, supervisor.

Discharge measurements of Little Sandy River near Marmot, Oreg., for the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
Nov. 25	F. F. Henshaw	1.90	216	July 11	C. L. Batchelder	.54	29.0
Jan. 28	R. R. Randell	1.56	134	Aug. 21	do	.25	13.9
Apr. 16	C. L. Batchelder	2.09	302				

Daily discharge, in second-feet, of Little Sandy River near Marmot, Oreg., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.
1			199	127	159	428	76	103	46	46	17
2			144	144	132	268	94	108	45	44	17
3			114	164	114	240	142	121	55	42	17
4			92	340	114	316	257	98	66	41	17
5			80	787	103	428	223	86	75	39	16
6			72	409	91	380	164	83	98	37	16
7			73	399	82	276	136	80	171	35	16
8			64	272	73	233	136	77	193	33	16
9			58	182	71	188	185	75	177	32	16
10	103		55	152	108	152	394	72	125	30	16
11	154		56	142	223	132	340	69	98	28	15
12	520		58	125	250	132	240	66	83	28	15
13	885		55	112	237	180	280	65	71	32	15
14	480		55	100	185	208	303	61	62	30	15
15	295		54	94	147	324	470	56	55	28	15
16	180		52	88	121	223	295	51	48	28	14
17	132		51	86	105	171	217	48	45	26	14
18	88		49	78	96	149	185	45	44	26	14
19	88		45	72	90	132	240	42	42	25	14
20	82		42	71	84	125	240	41	44	24	14
21	66		41	324	110	112	166	39	64	24	14
22	49		42	470	136	97	140	37	56	23	14
23	53		40	571	132	97	136	40	60	22	14
24	57		39	371	428	94	116	48	92	21	13
25	49		42	291	295	82	103	62	102	21	13
26	46	182	51	230	202	74	98	52	91	20	13
27	43	164	54	166	655	69	103	92	71	19	12
28	37	136	61	127	454	70	92	84	62	18	12
29	37	174	55	119		71	92	63	54	18	
30	53	169	54	136		72	96	55	50	18	
31	66		121	142		74		49		17	

NOTE.—Discharge determined from a well-defined rating curve. Water stage recorder not working; discharge estimated or interpolated, as follows: Interpolated, Oct. 12, May 6–10, July 2–5, 7–10, 22–27, and July 29 to Aug. 17; estimated from climatic data and by comparison with records, Bull Run River, Aug. 29 to Sept. 6, 12 second-feet; Sept. 7–14, 15 second-feet; Sept. 15–20, 50 second-feet; Sept. 21–28, 35 second-feet; Sept. 29, 34 second-feet; estimated, Sept. 30, at 35 second-feet.

Monthly discharge of Little Sandy River near Marmot, Oreg., for the year ending Sept. 30, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October 10–31	885	37	162	7,070	A.
November 26–30	182	136	165	1,640	A.
December	199	39	66.7	4,100	A.
January	787	71	222	13,600	A.
February	655	71	178	9,890	A.
March	428	69	181	11,100	A.
April	470	76	192	11,400	A.
May	121	37	66.7	4,100	A.
June	193	42	78.2	4,650	A.
July	46	17	28.2	1,730	A.
August	17	12	14.5	892	B.
September	.....	.....	30	1,790	C.

MIDDLE FORK OF WILLAMETTE RIVER NEAR OAKRIDGE, OREG.

LOCATION.—In the NE. ¼ sec. 27, T. 21 S., R. 3 E., 1,000 feet above mouth of Salt Creek and about 2 miles southeast of Oakridge.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 3, 1913, to September 30, 1914, when station was discontinued.

GAGE.—Vertical staff on right bank.

DISCHARGE MEASUREMENTS.—Made from cable and car or by wading at low water.

CHANNEL AND CONTROL.—Gravel and small boulders; may shift in extreme flood.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 3.12 feet at 4 p. m. January 23 (discharge, 5,960 second-feet); minimum stage recorded, 0.30 foot August 22 to September 6 (discharge, 280 second-feet).

ACCURACY.—Results excellent.

Discharge measurements of Middle Fork of Willamette River near Oakridge, Oreg., for the period Oct. 1, 1913, to Feb. 4, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 2, 1913	F. F. Henshaw...	0.41	364	Sept. 3, 1914	James E. Stewart.	.31	283
Nov. 20, 1913	James E. Stewart.	.74	634	Feb. 4, 1915	P. V. Hodges.....	1.52	1,720

Daily discharge, in second-feet, of Middle Fork of Willamette River near Oakridge, Oreg., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	350	414	1,280	3,410	1,380	4,230	700	1,230	930	528	315	280
2	350	366	1,170	4,080	1,280	3,410	700	930	906	510	315	280
3	366	350	995	2,640	1,200	2,170	700	2,720	788	510	315	280
4	350	414	810	2,330	1,130	2,520	722	2,640	755	494	315	280
5	350	1,280	722	2,170	956	2,900	700	2,640	722	390	315	280
6	390	2,900	680	1,860	930	3,020	722	2,570	788	414	315	280
7	1,510	1,860	620	2,640	834	3,150	755	2,520	1,130	430	315	494
8	810	1,200	650	2,330	788	2,770	810	2,520	930	430	315	414
9	680	930	620	2,170	755	2,570	956	2,470	930	430	315	390
10	555	995	620	1,720	810	2,400	1,510	2,400	810	430	315	390
11	528	906	600	1,280	995	2,100	1,770	2,640	810	430	315	366
12	494	810	600	1,060	995	1,960	1,540	2,240	1,060	430	315	366
13	582	700	600	1,170	930	1,860	1,320	2,520	995	430	315	350
14	510	620	582	1,230	956	1,770	1,350	2,770	930	414	315	366
15	510	600	555	1,280	956	1,510	2,060	2,520	870	390	315	390
16	510	582	510	1,060	930	1,430	2,770	2,060	834	390	315	494
17	494	510	582	930	956	1,350	1,860	2,060	788	390	294	700
18	470	555	582	930	956	1,280	1,510	1,960	755	366	294	650
19	430	620	555	1,030	956	1,230	1,430	1,960	722	366	294	510
20	430	722	510	1,090	1,030	1,200	1,350	1,860	700	366	294	430
21	414	906	528	3,670	1,090	1,200	1,280	1,900	680	350	294	414
22	390	1,200	600	5,740	1,350	1,230	1,090	1,860	650	350	280	390
23	350	1,130	582	5,960	1,280	1,230	1,090	1,860	555	350	280	390
24	366	995	528	5,740	2,900	1,130	1,130	1,650	930	350	280	366
25	350	906	582	5,580	2,770	930	930	1,540	810	350	280	366
26	350	834	680	5,740	2,640	834	2,640	1,350	755	336	280	350
27	350	1,090	700	4,680	3,150	755	2,280	1,350	700	315	280	350
28	350	1,380	680	3,150	3,940	810	2,060	1,320	620	315	280	350
29	350	1,600	650	1,770	.....	788	1,860	1,200	600	315	280	350
30	350	1,770	700	1,430	.....	755	1,600	1,130	555	315	280	350
31	350	.....	2,900	1,380	.....	650	.....	1,030	.....	315	280	.....

NOTE.—Discharge determined from a rating curve well defined up to 2,500 second-feet. Discharge estimated for lack of gage readings Oct. 1 and 2.

Monthly discharge of Middle Fork of Willamette River near Oakridge, Oreg., for the year ending Sept. 30, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	1,510	350	472	29,000	A.
November	2,900	350	972	57,800	A.
December	2,900	510	741	45,600	A.
January	5,960	930	2,620	161,000	A.
February	3,940	755	1,390	77,200	A.
March	4,230	650	1,780	109,000	A.
April	2,770	700	1,370	81,500	A.
May	2,770	930	1,980	122,000	A.
June	1,130	555	800	47,600	A.
July	528	315	394	24,200	A.
August	315	280	300	18,400	A.
September	700	280	389	23,100	A.
The year	5,960	280	1,100	796,000	

MIDDLE FORK OF WILLAMETTE RIVER AT JASPER, OREG.

LOCATION.—In the NW. ¼ sec. 23, T. 18 S., R. 2 W., just below Jasper post office, 2 miles above Natron and 3 miles below Fall Creek.

DRAINAGE AREA.—1,450 square miles.

RECORDS AVAILABLE.—September 16, 1905, to February 6, 1912; July 26, 1913, to September 30, 1914.

GAGE.—Vertical staff on right bank.

DISCHARGE MEASUREMENTS.—Made from new highway bridge, a short distance above the gage.

CHANNEL AND CONTROL.—Gravel and small boulders; shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 7.6 feet at 8 a. m. January 22 and 23 (discharge, 17,700 second-feet); minimum stage recorded, 2.90 feet, September 5 and 6 (discharge, 670 second-feet).

REGULATION.—Some storage developed on Waldo Lake but the gates of the dam have been open since 1909.

ACCURACY.—Results excellent.

Discharge measurements of Middle Fork of Willamette River at Jasper, Oreg., for the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 3	F. F. Henshaw	3.19	960
Sept. 5	James E. Stewart	2.93	696

Daily discharge, in second-feet, of Middle Fork of Willamette River at Jasper, Oreg., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,060	1,190	5,980	9,800	5,660	13,800	2,710	2,500	2,120	1,420	915	715
2	992	1,300	4,320	6,690	5,280	12,600	2,500	2,500	2,120	1,420	860	715
3	970	1,190	3,680	7,800	4,580	9,300	2,600	2,600	2,040	1,360	860	715
4	970	1,140	3,220	6,480	3,960	9,300	2,710	2,710	1,960	1,300	860	715
5	970	1,240	2,930	6,060	3,960	11,400	3,170	2,500	2,040	1,300	860	670
6	970	9,300	2,670	5,280	3,420	12,600	3,170	2,500	2,120	1,300	860	670
7	5,360	7,570	2,500	5,280	3,170	10,900	2,930	2,500	3,170	1,240	860	760
8	5,280	5,100	2,300	7,800	2,930	9,300	2,930	2,500	3,680	1,190	810	1,080
9	3,050	3,680	2,160	6,900	2,710	8,300	2,710	2,600	3,170	1,190	810	970
10	2,340	3,420	2,090	5,660	2,710	7,340	4,580	2,600	2,710	1,190	810	860
11	2,040	3,170	1,990	4,920	3,420	6,480	4,920	2,710	2,500	1,190	810	760
12	1,750	2,820	1,960	4,260	4,260	6,060	4,580	2,500	2,500	1,190	760	760
13	1,680	2,500	1,930	3,680	4,920	5,660	4,260	2,500	2,600	1,190	760	760
14	2,120	2,210	1,850	3,420	4,580	4,920	4,260	2,930	2,300	1,140	760	810
15	1,820	1,960	1,790	3,960	4,260	4,580	13,200	3,170	2,120	1,080	760	1,300
16	1,930	1,850	1,680	3,680	3,680	4,260	11,400	2,930	2,040	1,080	760	1,680
17	1,750	1,820	1,680	3,420	3,680	3,960	8,800	2,600	1,960	1,080	760	2,500
18	1,680	1,960	1,710	3,170	3,680	3,960	6,480	2,500	1,960	1,080	760	1,820
19	1,550	1,820	1,650	3,170	3,680	3,680	5,660	2,300	1,820	1,080	760	1,820
20	1,450	2,710	1,550	1,960	3,680	3,680	5,280	2,300	1,680	1,080	760	1,960
21	1,360	2,890	1,550	5,280	3,420	3,680	4,580	2,300	1,680	1,020	760	1,550
22	1,300	2,750	1,680	17,700	3,960	3,680	3,960	2,500	1,620	1,020	760	1,300
23	1,280	4,580	1,680	17,700	3,960	3,420	3,680	3,420	1,550	970	760	1,140
24	1,210	4,920	1,580	15,600	5,660	3,170	3,960	2,820	2,040	970	760	1,080
25	1,190	4,110	1,960	15,000	11,400	3,170	3,680	3,170	2,040	970	760	970
26	1,190	3,740	3,960	13,800	8,800	2,710	3,170	3,170	1,820	970	760	970
27	1,190	3,900	3,050	11,400	7,340	2,710	3,420	2,710	1,680	970	760	1,080
28	1,170	4,580	2,600	8,300	13,800	2,500	2,300	2,710	1,620	970	760	970
29	1,100	5,280	2,300	6,480	.....	2,710	2,930	2,400	1,550	970	760	915
30	1,100	7,430	2,120	6,480	.....	2,710	2,710	2,210	1,480	970	760	860
31	1,080	.....	3,820	6,480	.....	2,930	.....	2,120	.....	915	760	.....

NOTE.—Discharge determined from a rating curve well defined between 670 and 12,000 second-feet.

Monthly discharge of Middle Fork of Willamette River at Jasper, Oreg., for the year ending Sept. 30, 1914.

[Drainage area, 1,450 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
October	5,360	970	1,710	1.18	1.36	105,000	A.
November	9,300	1,140	3,400	2.34	2.61	202,000	A.
December	5,980	1,550	2,450	1.69	1.95	151,000	A.
January	17,700	1,960	7,340	5.06	5.83	451,000	A.
February	13,800	2,710	4,880	3.37	3.51	271,000	A.
March	13,800	2,500	5,980	4.12	4.75	368,000	A.
April	13,200	2,300	4,440	3.06	3.41	264,000	A.
May	3,420	2,120	2,630	1.81	2.09	162,000	A.
June	3,680	1,480	2,120	1.46	1.63	126,000	A.
July	1,420	915	1,120	.772	.89	68,900	A.
August	915	760	791	.546	.63	48,600	A.
September	2,500	670	1,100	.759	.85	65,500	A.
The year	17,700	670	3,150	2.17	29.51	2,280,000	

WILLAMETTE RIVER AT SPRINGFIELD, OREG.

LOCATION.—In the SW. ¼ sec. 35, T. 17 S., R. 3 W., at a highway bridge at Springfield.

DRAINAGE AREA.—2,150 square miles.

RECORDS AVAILABLE.—November 27, 1911, to December 31, 1913, when station was discontinued.

GAGE.—Vertical staff at Southern Pacific Railroad bridge; standard chain on downstream rail of highway bridge used prior to April 1, 1913. Datum of staff gage 0.15 foot higher than that of chain gage.

DISCHARGE MEASUREMENTS.—Made from highway bridge.

CHANNEL AND CONTROL.—Gravel and small stones; shifting in floods.

EXTREMES OF DISCHARGE.—Maximum stage recorded October 1 to December 31, 6.25 feet at 12 noon November 6 (discharge, 13,100 second-feet); minimum stage recorded, 0.75 foot at 12 noon October 31 (discharge, 1,170 second-feet); maximum discharge for year from records at Eugene, January 23, 27,000 second-feet; minimum stage for year from reading by Stewart, 0.10 foot September 1, 1914 (discharge, 684 second-feet).

ACCURACY.—Results good.

Discharge measurements of Willamette River at Springfield, Oreg., for the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 4	F. F. Henshaw	0.58	1,030
Sept. 1	James E. Stewart	.10	684

Daily discharge, in second-feet, of Willamette River at Springfield, Oreg., for the period October to December, 1913.

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1	1,260	1,280	8,120	11	2,570	4,380	2,780	21	1,590	4,980	2,290
2	1,230	1,300	6,600	12	3,660	3,840	2,640	22	1,570	4,780	2,360
3	1,210	1,300	5,640	13	2,860	3,320	2,570	23	1,540	7,600	2,570
4	1,210	1,340	5,760	14	2,780	2,940	2,430	24	1,390	7,860	2,290
5	1,210	1,490	4,580	15	2,320	2,570	2,360	25	1,300	6,120	3,840
6	1,300	13,100	3,840	16	2,430	2,430	2,290	26	1,340	5,880	5,880
7	6,960	9,500	3,580	17	2,320	2,290	2,220	27	1,300	6,120	5,200
8	7,080	6,360	3,320	18	2,030	2,780	2,220	28	1,260	7,340	4,200
9	5,420	5,200	2,860	19	1,860	2,570	2,220	29	1,210	9,220	3,840
10	3,660	4,780	2,780	20	1,690	4,020	2,150	30	1,210	12,600	4,580
								31	1,170	.....	10,400

NOTE.—Discharge determined from a well-defined rating curve.

Monthly discharge of Willamette River at Springfield, Oreg., for the period October to December, 1913.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	7,080	1,170	2,260	139,000	B.
November	13,100	1,280	4,980	296,000	B.
December	10,400	2,150	3,820	235,000	B.
The period				670,000	

WILLAMETTE RIVER AT ALBANY, OREG.

LOCATION.—In the SW. ¼ sec. 6, T. 11 S., R. 3 W., at the end of Broadalbin Street, about half a mile above the railroad bridge, just below the mouth of Calapooia Creek and 7 miles above Santiam River.

DRAINAGE AREA.—4,860 square miles.

RECORDS AVAILABLE.—1879 and 1894 to September 30, 1914; some fragmentary records 1880 to 1893.

GAGE.—Vertical staff in two sections.

DISCHARGE MEASUREMENTS.—Made from Corvallis & Eastern Railroad bridge.

CHANNEL AND CONTROL.—Sand and fine gravel; control practically permanent. Above gage height 17.0 feet water begins to flow through a slough several hundred feet to left of main channel.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 17.6 feet at 8 a. m., January 26 (discharge, 67,100 second-feet); minimum stage recorded, 0.7 foot September 3 to 7 (discharge, 2,760 second-feet).

ACCURACY.—Results excellent.

COOPERATION.—Gage-height record furnished by United States Weather Bureau.

The following measurement was made by P. V. Hodges:

September 4, 1914, gage height 0.68 foot; discharge, 2,780 second-feet.

Daily discharge, in second-feet, of Willamette River at Albany, Oreg., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	3,940	4,580	23,800	19,100	29,000	37,800	14,100	10,000	6,930	5,270	3,140	2,950
2	3,730	4,580	20,700	28,200	24,900	39,100	13,500	9,220	6,930	5,040	3,140	2,950
3	3,730	4,810	17,100	25,600	22,100	38,200	13,200	10,000	6,930	4,810	3,140	2,760
4	3,730	4,580	15,000	27,500	19,700	32,600	12,600	9,490	6,690	4,810	3,140	2,760
5	3,730	4,580	13,800	29,000	17,800	31,800	12,900	9,490	6,690	4,580	3,140	2,760
6	3,730	5,270	11,800	34,300	16,500	34,300	13,800	8,950	6,930	4,360	3,140	2,760
7	3,940	18,100	10,900	31,300	15,300	35,100	12,900	8,690	7,420	4,150	3,140	2,760
8	8,950	17,100	10,300	27,500	14,100	30,500	12,000	8,690	9,760	4,150	3,140	2,950
9	13,800	13,800	9,490	28,600	16,200	27,100	11,500	8,690	11,200	4,150	3,140	3,330
10	9,760	11,500	8,950	26,000	12,600	24,200	12,600	8,950	10,000	3,940	3,140	4,360
11	8,170	10,900	8,430	22,400	13,500	21,700	16,500	8,950	8,950	3,940	3,140	4,360
12	7,420	10,300	8,170	19,700	17,100	19,700	18,100	8,960	8,170	3,940	3,140	3,530
13	6,690	9,490	7,920	17,800	19,100	18,400	17,100	8,430	7,670	3,940	3,140	3,140
14	6,450	8,430	7,920	16,200	20,000	17,100	16,500	8,170	7,670	3,940	2,950	3,140
15	7,920	7,920	7,920	15,000	18,700	16,200	17,100	8,690	7,420	3,940	2,950	3,140
16	7,420	7,420	7,420	16,500	17,100	15,300	24,200	8,950	7,170	3,940	2,950	3,940
17	7,920	7,170	7,170	15,900	15,900	14,400	29,000	8,690	6,930	3,940	2,950	5,970
18	7,420	7,170	7,420	15,900	15,000	13,800	24,900	8,170	6,450	3,940	2,950	7,670
19	6,690	7,670	7,420	15,300	14,700	13,500	20,400	7,920	6,210	3,940	2,950	6,930
20	6,210	7,420	7,420	14,400	14,400	13,200	18,400	7,670	5,970	3,730	2,950	7,170
21	5,970	8,950	7,170	16,500	14,100	12,900	17,100	7,420	5,730	3,530	2,950	7,420
22	5,730	11,200	6,930	28,200	14,700	12,300	15,300	7,420	5,730	3,330	2,950	6,450
23	5,500	11,800	7,920	49,500	15,600	11,800	14,100	7,670	5,730	3,330	2,950	6,210
24	5,040	15,300	8,170	60,600	16,200	11,200	13,200	8,950	5,730	3,330	2,950	4,810
25	5,040	16,500	8,950	64,300	25,300	11,200	12,300	8,690	6,210	3,330	2,950	4,360
26	5,040	14,700	11,800	67,100	36,500	10,900	12,000	8,950	6,690	3,330	2,950	4,150
27	4,810	14,100	15,900	64,800	31,300	10,300	11,800	8,690	6,210	3,140	2,950	3,940
28	4,580	15,000	13,800	60,100	29,700	10,300	11,800	8,430	5,970	3,140	2,950	3,730
29	4,580	16,800	11,800	45,100	.....	10,300	11,200	8,170	5,730	3,140	2,950	3,730
30	4,580	20,700	11,200	33,900	.....	11,500	10,600	7,670	5,500	3,140	2,950	3,730
31	4,580	.....	12,000	29,700	.....	12,600	.....	7,170	.....	3,140	2,950	.....

NOTE.—Discharge determined from a rating curve well defined below and fairly well defined above 60,000 second-feet.

Monthly discharge of Willamette River at Albany, Oreg., for the year ending Sept. 30, 1914.

[Drainage area, 4,860 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
October	13,800	3,730	6,030	1.24	1.43	371,000	A.
November	20,700	4,580	10,600	2.18	2.43	631,000	A.
December	23,800	6,930	10,800	2.22	2.56	664,000	A.
January	67,100	14,400	31,200	6.42	7.40	1,920,000	A.
February	36,500	12,600	19,200	3.95	4.11	1,070,000	A.
March	39,100	10,300	20,000	4.12	4.75	1,230,000	A.
April	29,000	10,600	15,400	3.17	3.54	916,000	A.
May	10,000	7,170	8,580	1.77	2.04	528,000	A.
June	11,200	5,500	7,040	1.45	1.62	419,000	A.
July	5,270	3,140	3,880	.798	.92	239,000	A.
August	3,140	2,950	2,930	.603	.70	180,000	A.
September	7,670	2,760	4,260	.877	.98	253,000	A.
The year	67,100	2,760	11,600	2.39	32.48	8,420,000	

WILLAMETTE RIVER AT SALEM, OREG.

LOCATION.—In the NW. ¼ sec. 27, T. 7 S., R. 3 W., at the dock of the Oregon-Washington Railroad & Navigation Co. at Salem, below Santiam and Luckiamute rivers and above Mollala, Tualitin, and Clackamas rivers.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January 1, 1892, to September 30, 1914. Records continuous through the summer low-water periods only since 1904.

GAGE.—Vertical staff in four sections on right bank at mouth of slough.

DISCHARGE MEASUREMENTS.—Made from highway bridge about one-half mile below gage.

CHANNEL AND CONTROL.—Gravel and sand; practically permanent.

EXTREMES OF STAGE.—Maximum stage recorded during year, 16.3 feet at 8 a. m. January 25; minimum stage recorded, −1.3 feet August 28 to September 7.

COOPERATION.—Gage-height record furnished by U. S. Weather Bureau.

Estimates withheld for additional data.

Discharge measurements of Willamette River at Salem, Oreg., for the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
June 17	P. V. Hodges	1.46	9,970
Aug. 1	H. J. Dean	−.76	4,230

Daily gage height, in feet, of Willamette River at Salem, Oreg., for the year ending Sept. 30, 1914.

[H. A. Hoffman and C. C. Graham, observers.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	−0.1	0.6	8.3	6.7	8.4	11.6	4.6	3.2	1.7	0.7	−0.7	−1.3
2	−0.1	0.8	7.1	8.4	7.8	12.4	4.5	3.0	1.6	0.6	−0.7	−1.3
3	−0.2	0.8	6.1	8.3	7.0	11.6	4.3	3.0	1.6	0.5	−0.8	−1.3
4	−0.3	0.8	5.2	8.9	6.3	10.3	4.4	3.0	1.5	0.5	−0.8	−1.3
5	−0.3	0.7	4.7	10.0	5.9	10.3	4.8	2.9	1.5	0.4	−0.9	−1.3
6	−0.4	1.4	4.3	13.1	5.5	10.8	5.0	2.7	1.5	0.3	−0.9	−1.3
7	−0.2	5.6	3.9	11.6	5.1	10.8	4.6	2.6	1.8	0.2	−0.9	−1.3
8	5.8	5.8	3.7	10.2	4.7	9.9	4.2	2.6	2.9	0.2	−1.0	−1.1
9	5.3	4.8	3.4	9.5	4.4	8.8	4.1	2.7	3.5	0.1	−1.0	−0.8
10	3.8	4.0	3.1	8.7	4.2	7.9	4.4	2.9	3.3	0.1	−1.0	−0.5
11	3.1	3.8	3.0	7.7	4.5	7.1	5.5	2.8	2.8	0.1	−1.0	−0.7
12	2.8	3.5	2.9	6.8	5.8	6.5	6.0	2.6	2.4	0.1	−1.1	−0.8
13	2.5	3.0	2.8	6.1	6.5	6.1	5.7	2.5	2.2	0.0	−1.1	−0.9
14	2.6	2.7	2.7	5.7	6.8	5.8	5.9	2.5	2.1	0.0	−1.1	−0.9
15	3.1	2.5	2.5	5.4	6.4	5.5	6.2	2.5	1.9	−0.1	−1.1	−0.9
16	3.4	2.1	2.4	5.4	5.8	5.2	8.5	2.5	1.7	−0.1	−1.1	+1.0
17	3.7	2.0	2.3	5.4	5.4	5.0	9.2	2.5	1.6	−0.2	−1.2	1.9
18	3.2	2.4	2.3	5.3	5.1	4.8	8.1	2.2	1.4	−0.2	−1.2	2.7
19	2.7	2.4	2.4	5.0	5.0	4.6	6.8	2.1	1.3	−0.3	−1.2	2.5
20	2.2	2.4	2.3	4.8	4.9	4.5	6.2	2.0	1.2	−0.4	−1.2	3.5
21	1.9	2.8	2.1	5.6	4.8	4.3	5.8	1.9	1.1	−0.4	−1.2	3.2
22	1.7	3.6	2.0	9.5	5.1	4.1	5.2	1.8	1.0	−0.4	−1.2	2.4
23	1.5	4.7	2.5	13.4	5.6	3.9	4.8	1.9	0.9	−0.4	−1.2	1.7
24	1.2	7.0	2.6	15.5	6.0	3.8	4.5	2.1	0.9	−0.4	−1.2	1.1
25	1.0	6.6	2.7	16.3	10.5	3.7	4.2	2.2	1.3	−0.4	−1.2	0.7
26	0.9	5.8	3.9	15.9	12.3	3.5	4.0	2.3	1.6	−0.5	−1.2	0.5
27	0.8	5.5	4.9	15.8	11.5	3.3	3.8	2.3	1.3	−0.6	−1.2	0.3
28	0.7	5.9	4.7	14.9	11.1	3.3	3.7	2.2	1.1	−0.7	−1.3	0.3
29	0.7	6.3	4.3	12.6	.....	3.3	3.6	2.2	0.9	−0.7	−1.3	0.3
30	0.7	8.0	3.9	10.1	.....	3.6	3.4	2.0	0.8	−0.7	−1.3	0.1
31	0.6	.....	4.1	9.1	.....	4.1	.....	1.8	.....	−0.7	−1.3	.....

SALT CREEK NEAR OAKRIDGE, OREG.

LOCATION.—In the SE. ¼ sec. 22, T. 21 S., R. 3 E., about 100 feet below county highway bridge and 1½ miles southeast of Oakridge.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 19, 1913, to September 30, 1914, when station was discontinued.

GAGE.—Vertical staff on left bank.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Rocky; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.08 feet at 5 p. m. March 6 (discharge, 758 second-feet); minimum stage recorded, 1.00 foot August 19 to September 6 (discharge, 104 second-feet).

ACCURACY.—Results excellent.

Discharge measurements of Salt Creek near Oakridge, Oreg., for the period Oct. 1, 1913, to Feb. 4, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 3, 1913	F. F. Henshaw	1.24	146	Dec. 26, 1914	C. G. Paulsen	1.20	138
Nov. 20, 1913	James E. Stewart	1.57	213	Feb. 4, 1915	P. V. Hodges	2.04	349
Sept 3, 1914	do	1.00	104				

Daily discharge, in second-feet, of Salt Creek near Oakridge, Oreg., for the period Aug. 1, 1913, to Sept. 30, 1914.

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	200	158	138	174	302	459	200	598	250	338	338	189	112	104
2	205	168	148	174	284	478	237	578	250	323	338	178	112	104
3	200	174	148	138	272	338	250	578	250	338	338	178	112	104
4	189	189	148	148	245	370	250	661	250	354	308	178	112	104
5	182	178	148	323	237	354	278	724	250	370	308	178	112	104
6	182	168	168	558	224	338	278	766	250	370	323	168	112	104
7	178	148	314	448	219	404	250	724	264	370	354	158	112	168
8	178	162	237	338	212	440	250	724	293	370	338	168	112	178
9	168	148	229	308	205	338	250	619	338	370	308	158	112	168
10	162	158	200	323	200	387	264	558	459	440	308	158	112	158
11	168	142	200	284	200	338	264	518	478	404	293	158	112	158
12	174	154	178	264	200	308	250	478	459	370	354	158	112	168
13	168	142	212	245	196	323	278	478	440	422	338	158	112	158
14	178	142	200	224	182	354	278	478	478	478	323	158	112	168
15	178	148	196	224	178	323	278	440	558	404	308	158	112	178
16	182	142	182	229	174	308	278	422	682	404	308	148	112	224
17	196	138	178	200	182	250	278	404	619	404	308	148	112	264
18	189	134	178	205	200	237	278	404	478	387	293	138	112	250
19	182	129	174	205	178	250	278	422	518	387	278	138	104	224
20	182	138	168	219	174	264	293	404	518	397	278	138	104	178
21	182	154	158	237	178	478	293	404	498	498	278	129	104	168
22	178	158	158	264	200	619	308	422	478	478	250	129	104	148
23	168	154	158	314	212	640	308	404	478	498	224	120	104	138
24	162	148	158	332	200	619	354	404	459	440	250	120	104	129
25	158	138	158	293	212	598	338	370	440	440	250	120	101	120
26	158	138	148	264	224	661	354	338	422	404	250	120	104	138
27	154	142	148	314	196	558	518	323	370	404	237	120	104	138
28	148	168	148	354	189	478	598	293	370	370	200	112	104	129
29	158	174	148	364	178	308	.....	308	354	370	200	112	104	120
30	162	158	148	422	182	264	.....	308	338	354	189	112	104	120
31	142	.....	142	.....	459	158	.....	293	.....	354	.....	112	104	.....

NOTE.—Discharge determined from a rating curve well defined below 500 second-feet. Discharge estimated, owing to lack of gage reading, at 246 second-feet July 20–26, 1913. Discharge determined from gage heights for July 19, 27, 28, 29, 30, and 31, 1913, were 267, 224, 245, 212, 205, and 200 second-feet, respectively.

Monthly discharge of Salt Creek near Oakridge, Oreg., from July 19, 1913, to Sept. 30, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
1913.					
July 19–31	.....	200	237	6,100	A.
August	205	142	175	10,800	A.
September	189	129	153	9,100	A.
The period	.....	.....	.....	26,000	
1913–14.					
October	314	138	175	10,800	A.
November	558	138	280	16,700	A.
December	459	174	216	13,300	A.
January	661	158	395	24,300	A.
February	598	200	298	16,600	A.
March	766	293	479	29,500	B.
April	682	250	410	24,400	A.
May	498	323	397	24,400	A.
June	354	189	289	17,200	A.
July	189	112	146	8,980	A.
August	112	104	109	6,700	A.
September	264	104	154	9,160	A.
The year	766	104	279	202.000	

SALMON CREEK NEAR OAKRIDGE, OREG.

LOCATION.—In the NW. ¼ sec. 14, T. 21 S., R. 3 E., about 500 feet above Southern Pacific Railroad bridge, 1½ miles east of Oakridge.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—February 6 to September 30, 1914.

GAGE.—Inclined staff on right bank, 300 feet below vertical staff which was read up to November 21, 1913; new gage set at different datum.

DISCHARGE MEASUREMENTS.—Made by wading or from bridge.

CHANNEL AND CONTROL.—Gravel and small bowlders; shifting.

EXTREMES OF STAGE.—Maximum stage recorded during year, 4.55 feet at 6 p. m., March 5; minimum stage recorded, 1.6 feet, August 11 to September 6, and September 10, 11 (readings on inclined gage).

Estimates withheld for additional data.

Discharge measurements of Salmon Creek near Oakridge, Oreg., for the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.		Discharge.
		Old vertical.	New inclined.	
		Feet.	*Feet.*	*Sec.-ft.*
Oct. 2	F. F. Henshaw	0.53	.....	157
Nov. 22	James E. Stewart	.99	2.22	262
Sept. 2	.....do	.28	1.63	115

Daily discharge, in second-feet, of Salmon Creek near Oakridge, Oreg., for the years ending Sept. 30, 1913 and 1914.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1913.								
1	.....	270	1,590	455	820	795	235	175
2	.....	289	1,320	438	860	700	235	175
3	.....	334	1,040	420	810	820	235	220
4	.....	363	920	405	680	870	235	210
5	.....	430	970	420	620	770	228	192
6	340	470	845	508	560	672	228	182
7	.....	522	770	720	620	600	228	182
8	.....	630	720	845	620	532	220	182
9	.....	750	672	910	620	497	220	171
10	.....	770	672	860	525	455	215	171
11	.....	690	795	770	490	420	210	167
12	.....	618	870	680	455	405	204	167
13	.....	570	820	600	455	354	197	167
14	.....	482	745	542	448	346	197	162
15	.....	470	712	620	438	338	197	162
16	.....	430	660	660	420	330	197	162
17	.....	470	620	820	414	315	192	162
18	.....	530	745	995	405	300	192	156
19	.....	578	720	830	438	294	192	156
20	.....	510	700	712	542	285	192	156
21	.....	482	770	680	600	285	192	156
22	.....	442	720	720	680	285	188	156
23	418	404	640	795	700	285	188	156
24	394	372	600	860	1,320	285	188	156
25	354	334	660	860	1,140	285	188	156
26	342	320	680	870	920	270	182	156
27	315	320	700	895	1,020	264	182	156
28	282	510	620	810	1,140	255	182	171
29	.....	1,640	542	810	920	246	182	175
30	.....	2,500	490	810	870	240	175	171
31	.....	2,040	.....	712	.....	240	175	.....

Daily discharge, in second-feet, of Salmon Creek near Oakridge, Oreg., for the years ending Sept. 30, 1913 and 1914—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1913–14.												
1	167	171	552	600	520	1,130	325	440	360	260	152	114
2	162	171	488	750	560	1,010	325	440	325	260	152	114
3	156	167	448	650	480	850	325	440	325	260	152	114
4	156	171	408	560	440	1,010	400	440	400	230	152	112
5	156	375	380	560	400	1,430	480	400	360	230	148	112
6	182	770	360	560	400	1,370	440	400	400	260	130	112
7	760	700	353	700	360	1,190	440	400	520	202	148	171
8	390	508	332	650	360	1,070	400	400	480	202	126	148
9	384	399	318	600	325	950	520	400	480	202	126	130
10	306	381	297	560	400	900	560	400	440	202	126	120
11	285	345	297	480	400	850	560	400	400	189	120	120
12	255	318	297	480	480	850	520	400	440	189	120	126
13	300	291	297	400	480	750	560	400	400	189	120	130
14	285	279	284	440	480	700	560	440	362	181	120	202
15	278	270	275	400	480	650	1,010	480	325	181	120	260
16	270	261	266	400	440	650	850	480	325	176	120	325
17	255	261	260	400	480	600	750	420	325	176	120	260
18	240	255	254	360	480	560	700	360	325	176	120	260
19	228	249	236	325	480	560	650	325	290	176	120	230
20	210	261	230	360	480	560	560	325	290	171	120	230
21	197	261	230	560	480	560	560	360	290	164	120	181
22	192	353	230	1,010	480	560	520	360	260	164	120	164
23	188	512	224	1,010	480	520	520	440	260	164	120	164
24	175	500	208	950	650	480	520	440	400	164	120	152
25	171	480	254	950	750	440	480	480	325	157	114	141
26	171	488	290	850	700	400	520	400	325	157	114	141
27	171	500	275	750	1,010	400	480	400	260	152	114	148
28	167	488	275	650	1,190	360	440	400	260	152	114	141
29	167	700	275	560	.....	360	400	360	260	152	114	130
30	182	690	275	560	.....	325	480	325	260	157	114	134
31	171	.....	700	560	.....	325	.....	325	.....	152	114	.....

NOTE.—Daily discharge determined from rating curves as follows: Feb. 6 to Mar. 29, 1913, poorly defined. Mar. 30 to Nov. 21, 1913, well defined from 120 to 700 second-feet; gage records Nov. 6–21 reduced 0.15 foot before rating table was applied, as a submerged sand bar was formed by flood of Nov. 6 and caused gage to read 0.15 foot higher than water surface in main channel. Nov. 22, 1913, to Sept. 30, 1914, well defined between 110 and 700 second-feet, applied to new inclined gage established Nov. 22.

Monthly discharge of Salmon Creek near Oakridge, Oreg., for the years ending Sept. 30, 1913 and 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
1913.					
February 23–28	418	282	351	4,180	B.
March	2,500	270	630	38,700	C.
April	1,590	490	778	46,300	B.
May	995	405	711	43,700	B.
June	1,320	405	685	40,800	B.
July	870	240	421	25,900	B.
August	235	175	202	12,400	A.
September	220	156	170	10,100	A.
The period	.....	.....	.....	222,000	
1913–14.					
October	760	156	238	14,600	A.
November	770	167	386	23,000	B.
December	700	208	318	19,600	B.
January	1,010	325	601	37,000	B.
February	1,190	325	524	29,100	B.
March	1,430	325	722	44,400	B.
April	1,010	325	528	31,400	B.
May	480	325	403	24,800	B.
June	520	260	349	20,800	A.
July	260	152	189	11,600	A.
August	152	114	125	7,690	A.
September	325	112	163	9,700	A.
The year	1,430	112	378	274,000	

NORTH FORK OF MIDDLE FORK OF WILLAMETTE RIVER NEAR OAKRIDGE, OREG.

LOCATION.—In the SE. ¼ sec. 7, T. 21 S., R. 3 E., just below highway bridge about 2 miles north of Oakridge, and about 1 mile above former station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 1, 1913, to September 30, 1914. Fragmentary records, October 12, 1909, to September 30, 1912, at former station.

GAGE.—Stevens water-stage recorder just below highway bridge; also inclined staff in SW. ¼ sec. 8, 100 feet above railroad bridge.

DISCHARGE MEASUREMENTS.—Made from cable, at old gage, 1 mile below present gage, or by wading at low water.

CHANNEL AND CONTROL.—Rocky; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.8 feet at 4 p. m. January 25 (discharge, 2,890 second-feet); minimum stage from water-stage recorder, 0.59 foot (new datum) August 31 to September 4 (discharge, 138 second-feet).

ACCURACY.—Results good.

Discharge measurements of North Fork of Middle Fork of Willamette River near Oakridge, Oreg., for the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.		Discharge.
		Inclined gage.	Automatic gage.	
		Feet.	*Feet.*	*Sec.-ft.*
July 17, 1913	James E. Stewart	.....	1.71	491
Oct. 3, 1913	F. F. Henshaw	1.90	[a] .80	183
Nov. 21, 1913	James E. Stewart	2.85	[a] 1.65	461
Sept. 4, 1914	....do	1.66	.59	140

[a] Computed from curve of relations.

Daily discharge, in second-feet, of North Fork of Middle Fork of Willamette River near Oakridge, Oreg., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	180	266	1,110	1,320	1,020	1,700	519	575	485	329	200	138
2	180	330	900	1,400	1,020	1,550	508	575	485	321	200	138
3	184	394	885	1,660	990	1,400	542	552	485	313	196	138
4	206	527	870	1,240	960	1,700	575	530	485	313	196	138
5	221	660	772	1,160	945	2,000	650	552	485	313	193	.....
6	236	1,060	675	1,090	930	2,200	725	575	662	313	191	.....
7	535	1,460	625	1,090	870	2,390	712	600	840	313	191	.....
8	834	1,110	575	1,090	810	2,100	700	625	770	304	191	.....
9	813	764	552	1,055	718	1,800	830	650	700	307	188	.....
10	792	712	530	1,020	625	1,640	960	675	675	297	186	.....
11	643	660	530	900	650	1,480	1,060	650	650	291	184	.....
12	494	600	485	780	675	1,400	1,160	625	590	288	179	.....
13	484	539	485	740	758	1,320	1,030	625	530	282	176	.....
14	473	496	485	700	840	1,240	900	625	508	276	176	.....
15	453	453	445	625	840	1,160	1,190	625	485	267	176	.....
16	433	463	405	650	840	1,090	1,480	625	465	261	172	.....
17	429	473	405	675	825	1,020	1,400	625	445	253	172	.....
18	425	433	405	742	810	1,380	1,320	625	435	247	169	.....
19	367	394	388	810	825	1,750	1,170	600	425	242	167	.....
20	309	473	370	855	840	1,360	1,020	575	455	236	167	.....
21	294	610	370	900	900	960	930	600	485	233	162	.....
22	280	736	370	1,030	960	900	840	625	465	228	158	.....
23	270	633	352	1,160	1,480	840	810	650	445	226	155	.....
24	261	530	335	2,020	1,660	782	780	675	435	220	153	.....
25	251	730	455	2,890	1,850	725	752	675	425	220	149	.....
26	241	930	575	2,420	1,800	675	725	675	415	215	147	.....
27	235	900	530	1,950	1,750	625	675	662	405	213	144	.....
28	229	870	485	1,720	1,725	612	625	650	370	208	144	.....
29	238	1,100	465	1,480	.....	600	600	662	335	205	142	.....
30	246	1,320	445	1,250	.....	565	575	675	332	205	140	.....
31	256	.....	1,240	1,020	.....	530	.....	580	.....	203	138	.....

NOTE.—Discharge determined from two rating curves applicable as follows: Oct. 3 to July 7, well defined below 1,500 second-feet; July 8 to Sept. 30, well defined below 1,200 second-feet. Discharge estimated Oct. 1 and 2 (gage not having been installed until Oct. 3). Discharge Oct. 3 to July 7 based generally on a gage reading every other day, discharge for intermediate days being interpolated; water-stage recorder used July 8 to Sept. 30.

Monthly discharge of North Fork of Middle Fork of Willamette River near Oakridge, Oreg., for the period Oct. 1, 1913, to Sept. 4, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	834	180	371	22,800	B.
November	1,460	266	688	40,900	B.
December	1,240	335	565	34,700	B.
January	2,890	625	1,210	74,400	C.
February	1,850	625	1,030	57,200	B.
March	2,390	530	1,270	78,100	B.
April	1,480	508	859	51,100	B.
May	675	530	621	38,200	B.
June	840	332	506	30,100	B.
July	329	203	263	16,200	A.
August	200	138	171	10,500	A.
September 1–4	138	138	138	1,090	A.
The period				455,000	

McKENZIE RIVER AT CLEAR LAKE, OREG.

LOCATION.—In sec. 8, T. 14 S., R. 7 E., at the outlet of Clear Lake.

DRAINAGE AREA.—90 square miles.

RECORDS AVAILABLE.—June 20, 1912, to September 30, 1914.

GAGE.—A float gage in the lake and a vertical staff at the outlet, the latter for checking purposes only.

DISCHARGE MEASUREMENTS.—Made from a suspension footbridge at the outlet.

CHANNEL AND CONTROL.—Closely compacted volcanic sand and gravel bound together with fine silt; affected at times during summer by plant growth; timber bulkheads on each side; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 10.13 feet April 16 (discharge, 902 second-feet); minimum stage recorded, 7.92 feet September 11–13 (discharge, 215 second-feet).

ACCURACY.—Results excellent.

COOPERATION.—Record of daily gage height and discharge furnished by Oregon Electric Railway Co.

No discharge measurement made during the year.

Daily discharge, in second-feet, of McKenzie River at Clear Lake, Oreg., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	274	326	366	281	442	409	509	583	484	377	268	223
2	273	316	366	283	431	431	493	583	484	377	264	221
3	270	314	371	285	417	463	487	594	478	374	262	219
4	270	307	374	296	412	503	487	598	469	370	262	219
5	269	316	374	309	403	520	487	587	463	366	262	219
6	272	328	374	314	392	661	519	576	460	361	258	217
7	310	323	374	347	422	711	529	574	457	356	258	221
8	287	316	371	364	419	719	552	583	454	356	256	221
9	303	323	366	384	411	727	580	609	448	351	254	217
10	314	335	361	403	409	719	609	613	448	347	252	215
11	298	339	361	417	387	706	645	602	448	342	250	215
12	326	349	356	442	371	690	653	594	448	337	250	215
13	344	355	351	454	361	686	698	602	448	335	248	215
14	344	355	347	460	351	686	751	625	442	330	248	219
15	349	359	342	457	347	690	878	649	442	325	246	232
16	352	364	337	451	342	694	902	633	439	319	244	236
17	354	361	339	442	337	698	849	613	436	319	242	246
18	356	361	332	428	335	702	812	602	428	314	240	256
19	360	359	325	414	332	719	824	587	420	311	238	272
20	364	359	321	411	323	714	861	569	414	305	238	283
21	366	359	316	414	330	714	833	566	409	300	238	290
22	366	354	314	457	332	706	808	562	403	296	234	296
23	366	356	309	454	328	706	783	569	400	294	233	300
24	361	347	307	472	344	694	763	562	403	290	232	300
25	356	344	305	463	352	669	739	549	398	287	230	296
26	354	344	298	475	347	645	711	535	392	283	230	292
27	352	351	292	475	372	617	694	535	387	281	228	281
28	346	351	287	469	384	591	649	519	384	277	226	274
29	339	363	283	463	.....	569	621	509	382	274	226	268
30	336	363	283	460	.....	555	594	496	382	272	223	262
31	330	.....	291	454	.....	532	.....	491	.....	270	223	.....

NOTE.—Discharge determined from a well-defined rating curve.

Monthly discharge of McKenzie River at Clear Lake, Oreg., for the year ending Sept. 30, 1914.

[Drainage area, 90 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
October	366	269	328	3.64	4.20	20,200	A.
November	364	307	343	3.81	4.25	20,400	A.
December	374	283	335	3.72	4.29	20,600	A.
January	475	281	410	4.56	5.26	25,200	A.
February	442	323	373	4.14	4.31	20,700	A.
March	727	409	640	7.11	8.20	39,400	A.
April	902	487	677	7.52	8.39	40,300	A.
May	649	491	576	6.40	7.38	35,400	A.
June	484	382	432	4.80	5.36	25,700	A.
July	377	270	322	3.58	4.13	19,800	A.
August	268	223	244	2.71	3.12	15,000	A.
September	300	215	248	2.76	3.08	14,800	A.
The year	902	215	411	4.57	61.97	298,000	

McKENZIE RIVER AT McKENZIE BRIDGE, OREG.

LOCATION.—In the SE. ¼ sec. 14, T. 16 S., R. 5 E., at the highway bridge at McKenzie Bridge.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 8, 1910, to September 30, 1914.

GAGE.—Vertical staff at Hayes ranch, one-half mile above McKenzie Bridge. A second gage is located at Paradise ranger station, 2 miles above McKenzie Bridge, and a third, which was formerly read, is attached to the abutment of the highway bridge at McKenzie Bridge.

DISCHARGE MEASUREMENTS.—Made from cable three-eighths mile above the ranger station.

CHANNEL AND CONTROL.—Rocky; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded at ranger station during year, 3.22 feet at 8 a. m. January 23 (discharge, 2,870 second-feet); minimum stage recorded at ranger station, 1.62 feet September 5 and 10 (discharge, 1,070 second-feet).

Maximum stage recorded at Hayes ranch during year, 2.1 feet April 15 (discharge, 2,920 second-feet); minimum stage recorded, 0.3 foot September 1–6 and 9–12 (discharge, 1,080 second-feet).

ACCURACY.—Results good.

COOPERATION.—Gage-height record for ranger station furnished by U. S. Forest Service, C. R. Seitz, supervisor.

No discharge measurements made during the year.

Daily discharge, in second-feet, of McKenzie River at McKenzie Bridge, Oreg., for the year ending Sept. 30, 1914.

Day.	Oct.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,260	1,710	1,730	1,770	2,780	1,600	1,800	1,580	1,390	1,210	1,080
2	1,260	1,710	1,800	1,750	2,370	1,600	1,850	1,600	1,380	1,210	1,080
3	1,220	1,760	1,880	1,690	2,120	1,620	1,850	1,620	1,380	1,200	1,080
4	1,220	1,600	1,950	1,670	2,180	1,710	1,800	1,690	1,370	1,200	1,080
5	1,210	1,530	2,020	1,620	2,640	1,800	1,800	1,550	1,360	1,190	1,080
6	1,210	1,530	2,090	1,590	2,750	1,780	1,780	1,530	1,360	1,180	1,080
7	1,960	1,510	2,160	1,570	2,640	1,760	1,760	1,600	1,350	1,180	1,120
8	1,710	1,490	2,130	1,550	2,610	1,850	1,850	1,580	1,340	1,170	1,120
9	1,530	1,470	1,940	1,490	2,500	1,900	1,900	1,580	1,310	1,170	1,080
10	1,370	1,450	1,820	1,630	2,440	1,990	1,660	1,550	1,310	1,160	1,080
11	1,220	1,450	1,770	1,570	2,270	2,010	1,800	1,580	1,310	1,160	1,080
12	1,290	1,450	1,720	1,610	2,240	2,100	1,800	1,550	1,310	1,150	1,080
13	1,530	1,450	1,720	1,650	2,240	2,180	1,800	1,530	1,310	1,150	1,120
14	1,490	1,430	1,720	1,620	2,220	2,120	1,850	1,530	1,310	1,150	1,150
15	1,450	1,410	1,700	1,590	2,180	2,920	1,880	1,530	1,300	1,150	1,290
16	1,580	1,410	1,690	1,570	2,140	2,570	1,850	1,510	1,300	1,150	1,290
17	1,530	1,390	1,750	1,550	2,140	2,500	1,850	1,510	1,290	1,150	1,290
18	1,450	1,370	1,590	1,550	2,120	2,370	1,780	1,490	1,280	1,150	1,260
19	1,450	1,350	1,590	1,550	2,120	2,300	1,690	1,470	1,270	1,140	1,330
20	1,450	1,330	1,570	1,520	2,100	2,240	1,660	1,450	1,260	1,140	1,330
21	1,410	1,330	1,650	1,550	2,060	2,220	1,660	1,430	1,250	1,130	1,290
22	1,390	1,310	2,720	1,620	2,030	2,120	1,690	1,430	1,250	1,120	1 220
23	1,370	1,290	2,870	1,620	2,010	2,100	1,730	1,450	1,250	1,120	1,220
24	1,350	1,290	2,840	1,880	1,960	2,030	1,710	1,490	1,240	1,110	1,180
25	1,330	1,290	2,510	2,290	1,920	1,960	1,710	1,450	1,240	1,110	1,180
26	1,330	1,290	2,430	2,030	1,900	1,960	1,730	1,430	1,230	1,110	1,180
27	1,330	1,280	2,230	2,200	1,800	1,960	1,710	1,430	1,230	1,110	1,180
28	1,330	1,290	2,060	2,690	1,760	1,850	1,660	1,410	1,220	1,100	1,160
29	1,310	1,290	1,940	.....	1,710	1,850	1,580	1,390	1,210	1,100	1,150
30	1,310	1,330	1,880	.....	1,710	1,800	1,530	1,390	1,210	1,100	1,140
31	1,290	1,660	1,820	.....	1,660	.....	1,580	.....	1,210	1,090	.....

NOTE.—Discharge Oct. 1–30, Dec. 1–31, and Mar. 1 to June 30, and Sept. 1–30 determined from a rating curve well defined between 1,200 and 2,000 second-feet. Discharge Jan. 1 to Feb. 28 and July 1 to Aug. 31 obtained from record at Paradise Ranger Station by use of curve of relation determined from gage readings at the two stations when both gages were being read.

Monthly discharge of McKenzie River at McKenzie Bridge, Oreg., for the year ending Sept. 30, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	1,960	1,210	1,390	85,500	A.
November	.....	.....	[a] 1,500	89,300	C.
December	1,760	1,280	1,430	87,900	A.
January	2,870	1,570	1,980	122,000	B.
February	2,690	1,490	1,710	95,000	A.
March	2,780	1,660	2,170	133,000	A.
April	2,920	1,600	2,030	121,000	A.
May	1,900	1,530	1,750	108,000	A.
June	1,690	1,390	1,510	89,800	A.
July	1,390	1,210	1,290	79,300	A.
August	1,210	1,090	1,150	70,700	A.
September	1,330	1,080	1,170	69,600	A.
The year	2,920	1,080	1,590	1,150,000	

[a] Estimated by comparison with record of discharge at Clear Lake.

McKENZIE RIVER NEAR SPRINGFIELD, OREG.

LOCATION.—In sec. 32, T. 17 S., R. 1 W., at Hendrick's Ferry (an old river crossing replaced by a highway bridge in 1908), 3 miles below Walterville, 3 miles above Camp Creek, and 11 miles above Springfield.

DRAINAGE AREA.—960 square miles.

RECORDS AVAILABLE.—September 12, 1905, to September 30, 1914.

GAGE.—Vertical staff on left bank.

DISCHARGE MEASUREMENTS.—Made from cable 200 feet below gage.

CHANNEL AND CONTROL.—Coarse gravel and small boulders; shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.9 feet at noon January 24 (discharge, 15,600 second-feet), minimum stage recorded, 0.68 foot at noon, September 5 (discharge, 1,400 second-feet).

DIVERSIONS.—The power canal of the Eugene municipal plant has diverted water around the station since about February 14, 1911. Record has been kept of this diversion and the amounts added to the discharge of the river station.

ACCURACY.—Results good.

The following measurement was made by P. V. Hodges, September 5, 1914: Gage height, 0.68 foot; discharge, 1,410 second-feet.

Daily discharge, in second-feet, of McKenzie River near Springfield, Oreg., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,700	1,900	4,830	7,110	6,400	11,700	4,110	3,950	2,940	2,210	1,600	1,510
2	1,650	1,900	4,270	5,940	5,940	10,100	3,950	3,950	2,940	2,210	1,600	1,510
3	1,650	1,900	4,440	5,940	5,040	8,900	3,800	3,950	2,810	2,100	1,600	1,420
4	1,650	2,550	4,110	6,400	4,830	8,630	4,440	3,950	2,940	2,100	1,600	1,420
5	1,650	2,940	3,800	7,610	4,620	10,100	4,270	3,800	2,940	2,100	1,600	1,420
6	1,900	6,870	3,650	6,870	4,270	9,460	4,620	3,800	3,360	2,100	1,600	1,420
7	9,460	6,400	3,220	7,360	3,950	9,460	4,620	3,950	3,950	2,100	1,600	1,510
8	4,620	4,620	3,360	7,860	3,950	9,180	4,620	3,950	3,650	2,100	1,600	1,700
9	4,830	3,950	3,080	6,400	3,650	8,900	4,620	3,950	3,360	2,100	1,600	1,510
10	3,080	3,950	3,080	5,940	3,650	8,370	5,710	3,800	3,360	2,000	1,510	1,510
11	3,220	3,800	3,080	5,710	4,270	7,610	5,940	3,800	3,220	2,000	1,510	1,420
12	3,500	3,500	3,080	5,040	5,480	6,870	5,940	3,650	3,220	2,000	1,510	1,510
13	3,220	3,080	3,080	4,620	5,260	6,170	5,940	3,800	2,810	2,000	1,510	1,510
14	3,500	3,080	2,810	4,620	4,830	6,170	5,940	3,800	2,810	2,000	1,510	1,600
15	3,080	2,810	2,810	4,620	4,830	5,940	10,100	4,110	2,810	2,000	1,510	3,800
16	3,800	2,680	2,680	4,620	4,830	5,480	9,460	4,270	2,810	1,900	1,510	2,810
17	3,080	2,680	2,680	4,270	3,080	5,480	7,860	4,620	2,940	1,900	1,510	3,360
18	2,810	2,680	2,550	4,110	3,500	5,260	7,360	4,830	2,810	1,800	1,510	2,550
19	2,550	2,680	2,550	4,270	3,080	5,260	6,400	4,830	2,550	1,900	1,510	2,550
20	2,430	2,810	2,550	4,620	3,080	5,040	5,480	4,270	2,550	1,900	1,510	2,550
21	2,320	3,360	2,550	6,870	4,830	4,830	5,480	3,220	2,550	1,800	1,510	2,320
22	2,100	4,270	2,550	14,400	4,620	4,440	5,260	3,080	2,550	1,800	1,510	2,550
23	2,000	4,270	2,550	12,800	12,100	4,440	5,040	3,950	2,680	1,800	1,510	2,320
24	1,900	4,440	2,810	15,600	10,700	4,440	4,620	3,800	2,680	1,800	1,510	1,900
25	1,700	4,620	3,080	15,200	8,900	4,270	4,620	3,800	2,550	1,800	1,510	1,900
26	1,650	5,260	3,080	11,000	7,860	3,950	4,270	3,650	2,210	1,800	1,510	1,900
27	1,600	5,480	3,360	8,900	8,900	3,950	4,270	3,360	2,210	1,800	1,510	1,900
28	1,900	6,400	3,220	8,630	11,700	3,800	4,270	3,360	2,320	1,800	1,510	1,700
29	2,000	7,360	3,360	6,630	.....	3,950	3,950	3,220	2,210	1,700	1,510	1,700
30	2,000	7,110	8,370	7,860	.....	3,950	3,950	3,360	2,210	1,700	1,510	1,700
31	1,900	.....	7,110	6,400	.....	4,270	.....	3,080	.....	1,700	1,510	.....

NOTE.—Discharge determined from a rating curve well defined below 20,000 second-feet.

Monthly discharge of McKenzie River and Eugene power canal near Springfield, Oreg., for the year ending Sept. 30, 1914.

[Drainage area, 960 square miles.]

Month.	Discharge in second-feet.						Run-off.		Accuracy.
	River.			[a] Canal mean.	Total, mean.	Per square mile.	Depth inches.	Total in acre-feet.	
	Maximum.	Minimum.	Mean.						
October	9,460	1,600	2,720	296	3,020	3.15	3.63	186,000	B.
November	7,360	1,900	3,980	288	4,270	4.45	4.96	254,000	B.
December	8,370	2,550	3,480	297	3,780	3.94	4.54	232,000	B.
January	15,600	4,110	7,360	348	7,710	8.03	9.26	474,000	B.
February	12,100	3,650	5,650	343	5,990	6.24	6.50	333,000	B.
March	11,700	3,800	6,460	333	6,790	7.08	8.16	418,000	B.
April	10,100	3,800	5,360	297	5,660	5.90	6.58	337,000	B.
May	4,830	3,080	3,840	325	4,160	4.33	4.99	256,000	B.
June	3,950	2,210	2,830	337	3,170	3.30	3.68	189,000	B.
July	2,210	1,700	1,940	291	2,230	2.32	2.68	137,000	B.
August	1,600	1,510	1,540	291	1,830	1.91	2.20	113,000	B.
September	3,800	1,420	1,950	299	2,250	2.34	2.61	134,000	B.
The year	15,600	1,420	3,920	312	4,230	4.41	59.79	3,060,000	

[a] Monthly mean discharge obtained by taking mean of observations.

EUGENE POWER CANAL NEAR WALTERVILLE, OREG

LOCATION.—In sec. 29, T. 17 S., R. 1 W., 2 miles above Walterville.

RECORDS AVAILABLE.—September 7, 1911, to September 30, 1913; fragmentary.

GAGE.—Vertical staff on footbridge; gage used in 1911 and 1912 was at intake.

DISCHARGE MEASUREMENTS.—Made from wagon bridge near gage.

CHANNEL AND CONTROL.—Gravel; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.0 feet at 8 a. m. January 22 (discharge, 411 second-feet), minimum stage recorded, 2.8 feet, November 5 and 6 (discharge, 267 second-feet).

ACCURACY.—Results good for days when gage was read.

No discharge measurements made during the year.

Daily discharge, in second-feet, of Eugene Power canal near Walterville, Oreg., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1											291	
2						339						291
3		291			351			315				
4	291			351			291					
5		267							339	291		303
6		267	303									
7						327					291	
8		291										
9	303							315				
10			291	351	351		291					
11									339	291		
12						327						291
13												
14		291				327						
15	315	291	291	351	327		303	327	339		291	
16										291		
17			291			351						
18	291						291	327				291
19												
20				291	351				339		291	
21						327				291		
22				411								
23		315	291	339				327				
24					351		291					
25	291										291	
26										291		315
27						327			327			
28	291			339	327							
29		291									291	
30						339	315	339				303
31	291		315									

NOTE.—Discharge determined from a fairly well defined rating curve.

NORTH SANTIAM RIVER AT MEHAMA, OREG.

LOCATION.—In the NW. ¼ sec. 18, T. 9 S., R. 2 E., just below the highway bridge at Mehama, about 1½ miles north of Lyons and about ½ mile below the junction of Little North Santiam and North Santiam rivers.

DRAINAGE AREA.—740 square miles.

RECORDS AVAILABLE.—October 11, 1910, to September 30, 1914, when station was discontinued.

GAGE.—Staff in two sections on right bank; the lower section inclined, upper vertical.

DISCHARGE MEASUREMENTS.—Made from highway bridge, 150 feet above gage.

CHANNEL AND CONTROL.—Rocks and coarse gravel; shifting in floods.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.8 feet at noon October 7 (discharge, 18,400 second-feet); minimum stage recorded, 2.20 feet August 22 to September 6 (discharge, 660 second-feet).

ACCURACY.—Results good.

The following discharge measurement was made by P. V. Hodges:

June 20, 1914, gage height, 3.08 feet; discharge, 1,540 second-feet.

Daily discharge, in second-feet, of North Santiam River at Mehama, Oreg., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	830	1,320	6,320	5,000	4,340	13,000	3,280	3,680	1,820	1,440	830	660
2	830	1,320	6,320	4,780	3,900	11,200	3,280	3,680	1,820	1,320	830	660
3	830	1,210	5,760	5,000	3,900	9,760	3,900	3,480	2,100	1,320	830	660
4	830	1,440	5,500	4,560	3,480	9,420	3,900	3,480	2,250	1,320	830	660
5	830	1,960	5,000	4,560	4,120	9,080	4,560	3,280	2,400	1,210	830	660
6	1,010	1,820	5,000	4,120	3,900	9,080	4,560	3,280	2,400	1,210	785	660
7	18,400	2,100	4,780	4,120	3,900	7,800	5,000	3,280	3,080	1,210	785	740
8	9,420	1,960	5,000	3,900	4,560	7,500	5,500	3,080	2,900	1,110	740	740
9	6,040	1,960	4,560	3,900	4,340	6,900	6,320	3,080	2,560	1,110	740	740
10	3,280	1,820	3,900	3,480	4,120	6,320	6,600	2,900	2,560	1,110	740	740
11	3,280	1,820	3,480	3,480	3,900	6,320	6,040	2,720	2,250	1,110	740	740
12	4,120	2,100	2,900	3,480	4,120	5,760	5,500	2,720	2,250	1,110	740	740
13	3,900	2,100	2,400	3,680	4,120	5,760	5,240	2,560	2,100	1,010	740	740
14	3,680	2,400	2,400	3,480	3,900	5,500	7,200	3,280	1,960	1,010	740	875
15	3,900	2,400	2,560	3,680	3,900	5,240	12,300	2,900	1,960	1,010	740	3,480
16	3,900	2,900	2,560	3,900	5,000	5,000	9,420	2,720	1,820	1,010	740	2,900
17	3,480	2,560	2,900	4,340	5,760	5,000	7,800	2,560	1,680	1,010	740	3,680
18	3,280	2,900	2,900	5,000	6,320	4,560	6,320	2,400	1,680	1,010	740	2,560
19	3,080	3,280	3,280	6,320	6,320	4,560	5,760	2,400	1,560	1,010	740	5,000
20	2,900	3,280	3,280	7,800	7,200	4,120	5,760	2,250	1,560	1,010	740	4,340
21	2,560	2,900	3,280	9,420	7,800	4,120	5,240	2,100	1,680	920	740	2,560
22	2,250	3,900	3,900	14,900	7,800	3,900	5,240	2,100	1,820	920	660	2,250
23	2,100	10,500	3,680	11,900	8,760	3,900	5,000	1,960	1,560	920	660	1,680
24	1,820	6,320	3,900	10,500	9,080	4,560	5,000	2,100	1,560	920	660	1,440
25	1,560	5,000	4,120	9,080	9,420	5,000	4,560	1,960	1,560	920	660	1,440
26	1,440	4,560	4,120	8,120	9,420	5,000	3,900	2,100	1,560	830	660	1,440
27	1,320	4,560	4,560	7,800	10,100	5,240	3,900	2,100	1,440	830	660	1,380
28	1,320	4,560	5,000	7,200	11,200	5,000	3,900	1,820	1,440	830	660	1,380
29	1,320	7,800	5,000	6,600	.....	4,560	3,680	1,820	1,440	830	660	1,210
30	1,320	6,900	4,560	6,320	.....	4,340	3,680	1,820	1,440	830	660	1,110
31	1,440	.....	5,000	5,000	.....	3,680	.....	1,680	.....	830	660	.....

NOTE.—Discharge determined from a rating curve well defined between 800 and 6,000 second-feet.

Monthly discharge of North Santiam River at Mehama, Oreg., for the year ending Sept. 30, 1914.

[Drainage area, 740 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
October	18,400	830	3,110	4.20	4.84	191,000	A.
November	10,500	1,210	3,320	4.49	5.01	198,000	A.
December	6,320	2,400	4,130	5.58	6.43	254,000	A.
January	14,900	3,480	5,980	8.08	9.32	368,000	B.
February	11,200	3,480	5,880	7.95	8.28	327,000	B.
March	13,000	3,680	6,170	8.34	9.62	379,000	B.
April	12,300	3,280	5,410	7.31	8.16	322,000	B.
May	3,680	1,680	2,620	3.54	4.08	161,000	A.
June	3,080	1,440	1,940	2.62	2.92	115,000	A.
July	1,440	830	1,040	1.40	1.61	64,000	A.
August	830	660	732	.989	1.14	45,000	A.
September	5,000	660	1,600	2.16	2.41	95,200	A.
The year	18,400	660	3,480	4.70	63.82	2,520,000	

SANTIAM RIVER AT JEFFERSON, OREG.

LOCATION.—In the NE. ¼ sec. 11, T. 10 S., R. 3 W., at the Southern Pacific railroad bridge in Jefferson, about 2½ miles below the junction of North Santiam and South Santiam rivers and about 9 miles above the mouth.

DRAINAGE AREA.—1,890 square miles.

RECORDS AVAILABLE.—May 15, 1908, to September 30, 1914; July 19, 1905, to July 1, 1906.

GAGE.—Vertical staff on right bank.

DISCHARGE MEASUREMENTS.—Made from Southern Pacific railroad bridge or from the highway bridge just below it.

CHANNEL AND CONTROL.—Rock and coarse gravel; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.1 feet at 8 a. m. February 25 (discharge, 38,700 second-feet); minimum stage recorded, 0.7 foot August 21 to September 6 (discharge, 650 second-feet).

DIVERSIONS.—The Albany power canal diverts from South Santiam River near Lebanon; the Salem power canal, from North Santiam River near Stayton; and water is diverted from the North Santiam for irrigation near West Stayton.

Discharge measurements of Santiam River at Jefferson, Oreg., for the year ending Sept. 30, 1914.

[Made by P. V. Hodges.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
June 19	1.72	2,600
Sept. 3	.68	553

Daily discharge, in second-feet, of Santiam River at Jefferson, Oreg., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,040	1,900	17,800	18,900	14,800	29,700	6,900	5,800	3,020	2,110	900	650
2	1,040	2,550	13,800	14,800	12,300	29,100	6,500	5,800	3,270	1,900	900	650
3	1,040	2,550	10,800	15,800	11,300	23,100	7,700	4,900	3,270	1,900	900	650
4	1,040	2,550	9,850	16,800	9,850	23,100	9,850	6,500	3,020	1,700	770	650
5	900	3,020	8,950	16,800	9,850	24,900	14,300	6,500	3,020	1,520	770	650
6	1,040	14,800	7,300	23,700	8,950	29,100	12,300	5,800	3,020	1,520	770	650
7	5,200	14,800	6,500	29,700	7,700	24,300	9,850	5,200	4,330	1,520	770	770
8	22,500	10,800	6,150	21,300	6,500	20,100	8,500	4,330	6,500	1,520	770	1,040
9	13,800	8,100	5,800	20,100	6,500	18,300	9,850	4,900	6,500	1,520	770	1,040
10	8,500	7,300	5,500	16,800	5,800	16,800	11,300	5,800	5,800	1,520	770	1,040
11	8,100	6,900	5,200	14,300	9,400	14,800	14,800	5,500	4,900	1,520	770	900
12	6,900	5,800	5,200	11,800	13,800	13,800	13,800	4,900	4,330	1,350	770	770
13	5,500	5,200	5,200	10,800	14,800	12,800	12,300	4,610	4,330	1,350	770	770
14	10,300	4,900	4,900	9,850	14,800	12,300	13,300	4,610	3,790	1,350	770	900
15	8,500	4,330	4,900	9,400	8,100	10,300	19,500	4,330	3,270	1,350	770	3,020
16	15,300	3,530	4,610	8,950	9,850	10,800	26,100	4,060	3,270	1,350	770	7,700
17	11,300	3,530	4,060	8,950	9,850	10,300	20,100	3,530	3,020	1,350	770	9,400
18	9,850	4,060	4,330	8,500	9,850	9,850	14,300	3,790	3,020	1,190	770	6,900
19	5,800	3,790	4,060	7,700	9,400	9,400	14,300	3,790	2,330	1,190	770	5,800
20	5,500	4,900	4,060	7,300	8,950	8,950	14,800	3,530	2,780	1,190	650	6,900
21	5,200	5,800	3,530	9,400	8,950	8,950	12,800	3,530	2,550	1,190	650	7,700
22	4,610	5,800	3,530	37,500	9,850	7,700	10,800	3,790	2,550	1,190	650	4,330
23	4,060	19,500	4,060	36,300	12,300	7,700	9,400	3,790	2,330	1,040	650	3,530
24	3,270	14,800	4,060	37,500	14,800	6,900	9,400	3,790	2,550	1,040	650	3,020
25	3,020	13,800	4,610	31,500	38,700	6,150	8,100	3,790	3,530	1,040	650	2,550
26	2,780	13,800	8,950	26,700	26,100	6,150	7,300	4,060	3,020	1,040	650	2,330
27	2,780	13,800	8,100	24,300	23,100	5,800	7,700	3,530	2,780	900	650	2,330
28	2,330	14,800	6,500	15,300	30,900	5,800	7,300	4,610	2,550	900	650	2,330
29	2,550	16,800	5,800	15,300	.....	6,900	6,500	3,530	2,330	900	650	1,900
30	2,550	17,300	5,500	14,800	.....	5,800	5,800	3,530	2,330	900	650	1,700
31	2,330	.....	7,700	14,300	.....	5,200	.....	3,530	.....	900	650	.....

NOTE.—Discharge determined from a fairly well defined rating curve.

Monthly discharge of Santiam River at Jefferson, Oreg., for the year ending Sept. 30, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	22,500	900	5,760	354,000	B.
November	19,500	1,900	8,380	499,000	B.
December	17,800	3,530	6,490	399,000	B.
January	37,500	7,300	17,900	1,100,000	B.
February	38,700	5,800	13,100	728,000	B.
March	29,700	5,200	13,700	842,000	B.
April	26,100	5,800	11,500	684,000	B.
May	6,500	3,530	4,510	277,000	B.
June	6,500	2,330	3,440	205,000	B.
July	2,110	900	1,320	81,200	B.
August	900	650	736	45,300	B.
September	9,400	650	2,750	164,000	B.
The year	38,700	650	7,430	5,380,000	

SOUTH SANTIAM RIVER NEAR CASCADIA, OREG.

LOCATION.—In the NE. ¼ sec. 34, T. 13 S., R. 3 E., at the Cascadia ranger station, 3 miles above Cascadia, and about 12 miles above the junction of South Santiam and Middle Santiam rivers.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 3, 1910, to December 31, 1913, when station was discontinued; record fragmentary.

GAGE.—Vertical staff on left bank.

DISCHARGE MEASUREMENTS.—Made from cable near gage.

CHANNEL AND CONTROL.—Gravel and small boulders; practically permanent.

EXTREMES OF DISCHARGE.—This record is so fragmentary and the stream so flashy that it is impossible to give any extremes of discharge.

ACCURACY.—Results good for low and medium stages.

COOPERATION.—Gage-height record furnished by United States Forest Service, F. H. Brundage, supervisor.

The following discharge measurement was made by P. V. Hodges:

June 23, 1914, gage height, 2.45 feet; discharge, 134 second-feet.

Daily discharge, in second-feet, of South Santiam River near Cascadia, Oreg., for the period November, 1911, to December, 1913.

Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1911–12.											
1			270	760		354		514		64	
2			221	588	856		760				480
3			198	550	808	325					
4			176	480	808						
5			245	550	1,010	325				59	
6			245	514	856	325			354		221
7		325	4,430	588	808		628				
8			1,760	550	808						
9			1,550	628	714		714				
10	464	384	1,120	550							
11		670	808		628						
12		354	4,250	628	550	340					
13	1,360	325	5,700		447				120	64	
14	1,830	297	3,000	808	415						137
15	1,240	325	1,760	1,180							
16	1,240	480	1,690	3,260		354				384	
17		384	1,120	2,200	354			325	97	270	
18		325	906	1,690	415	384	415				
19	447	325	714	1,360	384						
20		384	670	1,120	354				90		
21		325	628	856				447			104
22	384	325	588	760	297						
23	354	354	714	714	289				76		
24		415	628	808	297					70	
25		354	1,690	588		156	354				
26		325	1,420	588				447	76		
27		354	1,240	1,060	297						120
28		384	1,240								
29		325	1,300	906				325			
30	156	325	1,060		325					588	90
31			906								

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1912–13.												
1				760	384	221	1,760	354	714	514		
2				670							76	
3		1,760		1,550	325	415	856	325	628			
4	104				325					588		
5					297		1,180	415	447			
6					270	514						90
7		1,420		480		550	760	480	480			
8					221	588						
9		1,690		480			628	808			64	
10				415	270	628	670	1,010				
11	76			384	270	514	856	956	325			
12				415	297	447			297			
13				550	325	354	760					64
14				514			670		325	156	76	
15					956		628	956				
16											76	
17				354	1,010		588	856				
18	64			760	760	670	714		325	127		
19					588					120	64	
20				384	415				297			54
21				325	325					104		
22	550			297		384			906		54	
23				270		325	514			104		
24	384			384	297	297	514					
25				480			628					45
26					270	270		760		90		
27	325			447		270	550		588	90		45
28					245	480				90		
29				447		3,260						
30						3,440	447				45	
31				384		2,520		670				

Daily discharge, in second-feet, of South Santiam River, near Cascadia, Oreg., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1				11			354	21			
2				12				22		480	
3		297		13				23			
4				14	354			24			
5	45	514		15				25			
6				16				26			
7	1,360	550	325	17			480	27		588	
8				18				28			
9				19				29			
10		354		20	325			30		808	856
								31			856

NOTE.—Discharge determined from a rating curve well defined below 1,000 second-feet and an extension above not defined. No attempt has been made to make monthly estimate owing to fragmentary record.

YAMHILL RIVER AT LA FAYETTE, OREG.

LOCATION.—In sec. 7, T. 4 S., R. 3 W., at the Government locks, three-fourths mile below La Fayette, and about 8 miles above the mouth of the stream.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—1901 to September 30, 1914.

GAGE.—Vertical staff attached to lower end of locks. Readings have also been made on a second gage in the backwater just above the locks and on a third gage at the county bridge at La Fayette.

DISCHARGE MEASUREMENTS.—Made from highway bridge at La Fayette, three-fourths mile above the locks, or by wading below the locks.

CHANNEL AND CONTROL.—Gravel, sand, and mud; shifting in low water.

EXTREMES OF STAGE.—Maximum stage recorded during year, 47.3 feet January 6; minimum stage, 2.5 feet September 2–4.

COOPERATION.—Gage-height record furnished by United States Engineer Corps.

Estimates withheld for additional data.

No discharge measurements made during the year.

Daily gage height, in feet, of Yamhill River at La Fayette, Oreg., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	3.6	4.8	23.8	21.5	22.6	26.0	13.8	8.8	6.1	4.8	3.1	2.6
2	3.6	5.9	21.0	23.4	21.1	26.9	13.2	8.3	5.9	4.7	3.1	2.5
3	3.5	5.6	17.2	23.6	18.9	25.7	12.8	8.3	5.8	4.5	3.1	2.5
4	3.4	5.3	15.0	27.3	17.1	23.7	13.0	8.3	5.8	4.7	3.1	2.5
5	3.3	5.5	13.1	39.9	16.2	22.7	14.0	8.2	5.8	4.7	3.0	2.6
6	3.4	10.0	12.3	47.3	15.3	22.2	13.7	7.8	5.8	4.6	3.0	2.6
7	4.0	14.7	11.6	42.3	14.4	22.5	12.5	7.7	6.5	4.2	3.0	2.6
8	10.8	14.0	11.1	34.7	13.5	20.9	11.7	7.7	7.6	4.1	3.0	2.8
9	11.2	12.2	9.9	30.5	12.6	18.9	11.0	8.3	8.2	4.1	2.9	3.3
10	9.3	10.7	9.6	26.8	12.3	17.2	11.4	8.1	8.1	4.0	2.9	3.5
11	8.0	9.9	9.4	23.8	13.0	15.8	12.9	7.8	7.6	3.9	2.8	3.3
12	7.8	9.3	9.8	21.0	15.1	14.9	13.7	7.6	7.1	3.9	2.9	3.1
13	7.1	8.8	9.5	19.7	16.2	14.0	13.3	7.3	6.9	4.0	2.8	3.0
14	7.8	8.2	9.4	18.9	16.3	13.6	13.7	7.1	6.9	3.8	2.8	3.0
15	8.7	7.6	9.7	18.0	15.6	12.8	15.3	7.1	6.6	4.0	2.8	3.3
16	8.8	7.2	9.3	18.9	14.6	12.3	17.6	7.2	6.3	4.2	2.8	4.0
17	9.7	7.9	9.1	18.7	13.3	11.7	19.0	7.2	5.9	3.9	2.8	6.5
18	8.7	12.8	9.8	17.7	12.8	11.3	18.0	6.9	5.8	3.7	2.8	7.4
19	7.7	10.7	9.7	15.8	12.6	11.0	15.8	6.8	5.6	3.7	2.8	7.9
20	7.2	10.8	9.2	16.4	12.3	10.8	14.3	6.5	5.5	3.7	2.7	9.2
21	6.7	11.0	9.0	23.5	12.2	10.3	13.6	6.4	5.5	3.5	2.8	8.8
22	6.2	11.9	9.2	29.8	15.2	9.9	12.7	6.3	5.4	3.4	2.8	7.7
23	5.9	17.6	11.0	34.1	17.0	9.7	11.7	6.3	5.3	3.4	2.8	6.7
24	5.7	21.7	11.2	34.5	18.9	9.4	11.0	6.6	5.3	3.5	2.8	5.9
25	5.4	19.7	12.1	34.8	26.0	9.5	10.7	6.9	5.8	3.4	2.7	.35
26	5.2	18.6	15.3	35.8	27.8	9.7	10.4	6.8	6.0	3.3	2.6	4.8
27	5.1	18.6	14.9	36.0	26.5	9.6	9.8	7.0	5.9	3.3	2.6	4.8
28	4.9	19.1	14.5	34.5	25.8	10.0	10.0	6.9	5.7	3.3	2.6	5.2
29	4.9	21.4	13.4	30.9	.....	10.1	9.5	6.9	5.4	3.2	2.6	4.8
30	4.8	25.8	12.7	26.6	.....	10.4	9.1	6.7	5.0	3.2	2.6	4.6
31	4.6	.....	15.9	23.8	.....	12.4	.....	6.4	.....	3.1	2.6	.....

CLACKAMAS RIVER NEAR CAZADERO, OREG.

LOCATION.—In the NE. ¼ sec. 11, T. 4 S., R. 4 E., 2 miles above the dam of the Portland Railway, Light & Power Co. at Cazadero.

DRAINAGE AREA.—685 square miles.

RECORDS AVAILABLE.—January 1, 1909, to September 30, 1914.

GAGE.—Friez water-stage recorder referred to a vertical staff on right bank.

DISCHARGE MEASUREMENTS.—Made from a cable 50 feet below gage.

CHANNEL AND CONTROL.—Rocks and gravel; shifting in extreme floods.

EXTREMES OF DISCHARGE.—Maximum stage from water-stage recorder, 34.6 feet at noon January 5 (discharge, 14,400 second-feet); minimum stage recorded, 25.82 feet September 2–6 (discharge, 766 second-feet).

ACCURACY.—Results excellent.

COOPERATION.—Record furnished by Portland Railway, Light & Power Co.

Discharge measurements of Clackamas River near Cazadero, Oreg., for the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
July 23	Batchelder and Henshaw	26.05	962	Aug. 7	Brooks and Scupham	25.95	906
23	do	26.05	955	14	do	25.90	826
28	Brooks and Scupham	26.00	927	14	Brooks and McMillan	25.90	840
28	do	26.00	936	27	J. A. Brooks	25.85	798
Aug. 7	do	25.95	885	27	do	25.85	783

Daily discharge, in second-feet, of Clackamas River near Cazadero, Oreg., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	958	1,210	3,340	2,560	2,980	6,900	2,350	2,520	1,800	1,210	886	774
2	944	1,190	2,800	2,860	2,800	5,780	2,460	2,740	1,760	1,180	886	766
3	944	1,130	2,510	3,220	2,570	4,840	2,680	2,920	1,740	1,180	878	766
4	951	1,140	2,340	5,100	2,520	5,230	3,220	2,800	1,740	1,170	878	766
5	944	1,350	2,070	11,400	2,400	5,640	3,880	2,620	1,780	1,160	870	766
6	1,110	3,280	1,970	8,010	2,300	6,080	3,520	2,570	1,810	1,140	862	766
7	5,690	2,620	1,920	6,900	2,040	5,500	3,220	2,570	2,140	1,110	862	846
8	3,340	2,180	1,820	6,240	2,040	5,100	3,160	2,740	2,140	1,090	846	1,000
9	2,740	1,920	1,670	4,840	1,990	4,840	3,340	3,220	2,300	1,090	846	937
10	2,290	1,920	1,620	4,120	1,990	4,360	4,600	2,920	2,090	1,080	846	846
11	2,290	1,870	1,590	3,520	2,350	4,000	4,480	2,680	1,940	1,050	838	838
12	1,970	1,670	1,580	3,160	2,520	3,760	4,000	2,570	1,830	1,040	846	928
13	2,180	1,570	1,570	2,920	2,920	3,760	4,360	2,680	1,740	1,080	838	862
14	2,340	1,490	1,530	2,680	2,800	3,880	4,600	2,740	1,650	1,060	838	1,000
15	2,460	1,420	1,510	2,680	2,570	4,000	6,730	2,680	1,590	1,030	830	2,140
16	2,800	1,370	1,510	2,570	2,400	4,120	6,080	2,570	1,540	1,010	830	2,090
17	2,290	1,370	1,500	2,520	2,300	4,120	4,970	2,350	1,500	982	830	2,240
18	1,970	1,400	1,480	2,460	2,240	3,880	4,360	2,240	1,460	982	830	1,840
19	1,820	1,420	1,440	2,300	2,140	3,760	4,360	2,190	1,420	991	830	2,300
20	1,670	1,580	1,370	2,190	2,090	3,640	4,480	2,140	1,400	982	822	2,460
21	1,550	1,540	1,330	3,340	2,240	3,520	4,000	2,140	1,420	964	814	1,990
22	1,440	1,820	1,300	7,820	2,620	3,280	3,520	2,140	1,370	955	814	1,640
23	1,350	4,820	1,300	8,010	2,570	3,160	3,280	2,190	1,380	946	814	1,410
24	1,360	4,180	1,250	7,260	4,600	3,040	3,160	2,140	1,480	937	806	1,270
25	1,290	3,340	1,240	5,780	6,080	2,860	2,920	2,140	1,470	937	806	1,180
26	1,240	3,100	1,230	5,230	4,480	2,680	2,800	2,040	1,390	928	806	1,140
27	1,270	3,100	1,240	4,480	6,240	2,620	2,800	2,090	1,330	910	798	1,190
28	1,210	2,980	1,260	3,880	6,560	2,520	2,680	2,040	1,290	910	790	1,140
29	1,160	4,430	1,270	3,400	.....	2,400	2,520	1,890	1,260	910	782	1,080
30	1,140	4,180	1,250	3,280	.....	2,400	2,460	1,840	1,230	902	790	1,040
31	1,130	.....	2,120	3,040	.....	2,460	.....	1,800	.....	894	782	.....

NOTE.—Discharge determined from two rating curves applicable as follows: Oct. 1 to Jan. 5, well defined; Jan. 6 to Sept. 30, well defined below and fairly well defined above 2,000 second-feet.

Monthly discharge of Clackamas River near Cazadero, Oreg., for the year ending Sept. 30, 1914.

[Drainage area, 685 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
October	5,690	944	1,800	2.63	3.03	111,000	A.
November	4,820	1,130	2,220	3.24	3.62	132,000	A.
December	3,340	1,230	1,680	2.45	2.82	103,000	A.
January	11,400	2,190	4,440	6.48	7.47	273,000	B.
February	6,560	1,990	2,980	4.35	4.53	166,000	B.
March	6,900	2,400	4,000	5.84	6.73	246,000	B.
April	6,730	2,350	3,700	5.40	6.02	220,000	B.
May	3,220	1,800	2,420	3.53	4.07	149,000	A.
June	2,300	1,230	1,630	2.38	2.66	97,000	A.
July	1,210	894	1,030	1.50	1.73	63,300	A.
August	886	782	832	1.21	1.40	51,200	A.
September	2,460	766	1,270	1.85	2.06	75,600	A.
The year	11,400	766	2,330	3.40	46.14	1,690,000	

OAK GROVE FORK OF CLACKAMAS RIVER AT TIMOTHY MEADOWS, NEAR CAZADERO, OREG.

LOCATION.—At Timothy Meadows, about 11¼ miles above station at intake, about 17 miles above mouth of Oak Grove Fork, and 43 miles above Cazadero.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—February 25, 1913, to September 30, 1914.

GAGE.—Friez water-stage recorder.

DISCHARGE MEASUREMENTS.—Made from cable.

CHANNEL AND CONTROL.—Practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 1.55 feet April 15 and 16 (discharge, 316 second-feet); minimum stage from water-stage recorder, 0.65 foot September 25 (discharge, 132 second-feet).

ACCURACY.—Results excellent.

COOPERATION.—Record furnished by the Portland Railway, Light & Power Co.

The following measurement was made by Frank Ewing, September 4, 1914: Gage height, 0.65 foot; discharge, 132 second-feet.

Daily discharge, in second-feet, of Oak Grove Fork of Clackamas River at Timothy Meadows, near Cazadero, Oreg., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	141	155	136	166	192	206	237	181	162	146	136
2	.....	141	152	138	163	188	210	237	179	161	145	136
3	.....	141	150	138	161	186	218	239	177	160	143	134
4	.....	141	146	139	159	186	235	237	183	160	143	134
5	.....	148	143	157	159	194	241	233	186	159	141	138
6	.....	161	143	155	159	206	237	231	192	158	143	139
7	.....	157	143	159	157	206	231	231	196	157	141	139
8	.....	155	145	166	157	206	226	233	192	157	141	141
9	.....	152	145	164	155	212	237	243	188	157	139	141
10	.....	150	143	163	155	206	271	241	185	157	138	138
11	.....	150	141	161	155	206	267	233	182	157	138	139
12	.....	148	141	161	154	204	258	226	179	161	138	139
13	.....	146	141	159	154	210	282	226	176	158	136	139
14	.....	143	141	157	154	216	287	226	173	154	138	141
15	.....	143	141	155	154	224	316	226	173	150	138	146
16	.....	143	141	154	155	235	316	226	173	150	139	143
17	.....	143	141	152	155	241	290	218	173	150	139	143
18	152	143	139	150	154	233	278	212	172	150	138	139
19	150	143	138	150	152	233	282	208	172	150	138	138
20	148	143	138	150	152	233	287	204	172	150	141	138
21	146	143	138	163	152	237	273	202	170	150	139	136
22	145	150	138	186	150	233	265	202	168	150	139	134
23	143	164	138	185	152	248	262	200	163	150	139	134
24	141	159	138	183	154	235	258	200	163	150	139	134
25	141	157	138	185	166	229	254	198	164	150	139	132
26	141	157	138	186	164	222	258	196	166	150	139	136
27	141	157	136	186	179	216	258	196	166	148	139	134
28	141	157	136	172	186	214	254	192	165	148	141	134
29	141	157	136	170	.....	212	241	186	164	148	139	134
30	141	155	136	166	.....	210	237	183	163	146	139	134
31	141	.....	138	166	.....	206	.....	181	.....	146	138	.....

NOTE.—Discharge determined from a well-defined rating curve. Discharge Oct. 1-17 estimated, for lack of gage readings, 160 second-feet from study of records on Clackamas near Cazadero. Discharge interpolated for lack of gage readings, June 8-13, June 27 to July 6, and July 13 and 14.

Monthly discharge of Oak Grove Fork of Clackamas River at Timothy Meadows, near Cazadero, Oreg., for the year ending Sept. 30, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	.....	.....	153	9,410	B.
November	164	141	150	8,930	A.
December	155	136	141	8,670	A.
January	186	136	162	9,960	A.
February	186	150	158	8,780	A.
March	248	186	215	13,200	A.
April	316	206	258	15,400	A.
May	243	181	216	13,300	A.
June	196	163	175	10,400	A.
July	162	146	153	9,410	A.
August	146	138	140	8,610	A.
September	146	132	137	8,150	A.
The year	316	132	172	124,000	

OAK GROVE FORK OF CLACKAMAS RIVER AT INTAKE NEAR CAZADERO, OREG.

LOCATION.—In the SW. ¼ sec. 4, T. 6 S., R. 7 E., at proposed intake of Oak Grove power development of Portland Railway, Light & Power Co., about 35 miles above Cazadero.

DRAINAGE AREA.—131 square miles (by power company).

RECORDS AVAILABLE.—May 21, 1909, to September 30, 1914.

GAGE.—Watson water-stage recorder; vertical staff prior to March, 1912.

DISCHARGE MEASUREMENTS.—Made from cable.

CHANNEL AND CONTROL.—Gravel; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder 1.90 feet at 8 a. m. April 15 (discharge, 1,030 second-feet); minimum stage from water-stage recorder, 0.71 foot August 30 to September 3 (discharge, 354 second-feet).

The following measurement was made by Frank Ewing:
September 4, 1914, gage height, 0.70 foot; discharge, 348 second-feet.

Daily discharge, in second-feet, of Oak Grove Fork of Clackamas River at intake near Cazadero, Oreg., for year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	July.	Aug.	Sept.
1	.....	385	485	417	530	740	590	656	428	385	354
2	.....	382	470	452	510	692	585	680	425	382	354
3	.....	382	456	452	495	650	585	656	425	378	354
4	.....	385	448	510	495	662	595	668	417	374	357
5	.....	382	434	668	480	734	623	680	413	374	357
6	.....	397	432	632	461	775	651	674	409	371	357
7	.....	409	430	692	461	754	679	632	405	368	368
8	.....	425	428	662	452	754	705	674	401	368	368
9	.....	425	426	615	448	736	733	674	401	371	360
10	.....	421	423	570	448	717	761	656	401	368	364
11	.....	413	421	545	470	698	789	644	397	368	368
12	.....	405	419	480	475	680	782	644	401	368	360
13	.....	405	417	515	470	701	859	644	397	368	357
14	.....	401	417	510	461	722	866	638	393	368	393
15	.....	397	417	495	461	761	1,010	620	385	368	417
16	.....	393	413	480	461	782	936	610	385	368	405
17	.....	397	413	480	461	775	873	600	385	368	397
18	.....	393	405	470	461	754	845	585	385	368	382
19	425	401	405	461	461	768	845	575	382	368	389
20	421	393	405	461	461	768	845	570	382	368	389
21	413	389	405	570	466	740	817	570	378	364	374
22	409	443	405	704	470	728	789	560	374	368	368
23	405	515	401	728	461	716	768	590	374	364	368
24	405	480	401	710	540	710	740	575	374	364	364
25	393	480	397	668	565	680	728	550	382	364	360
26	389	480	397	650	540	656	734	525	382	360	359
27	385	480	397	620	704	638	728	530	382	360	358
28	378	490	397	570	686	620	698	525	382	357	357
29	378	530	401	560	.....	615	668	525	382	357	357
30	378	510	405	550	.....	605	656	520	385	354	357
31	382	.....	438	540	.....	600	.....	520	385	354	.....

NOTE.—Discharge determined from a well-defined rating curve. Discharge interpolated for lack of gage readings, Dec. 6–12; Mar. 9–11 and 13; Apr. 5–10; Sept. 26 and 27. Discharge estimated, for lack of gage readings, as follows: Oct. 1–18, 420 second-feet; May 30 and 31, 520 second-feet; June 1–30, 475 second-feet; July 1, 428 second-feet; July 2, 425 second-feet.

Monthly discharge of Oak Grove Fork of Clackamas River at intake near Cazadero, Oreg., for the year ending Sept. 30, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	.....	.....	[a] 410	25,200	C.
November	530	382	426	25,300	A.
December	485	397	420	25,800	A.
January	728	417	562	34,600	A.
February	704	448	495	27,500	A.
March	782	600	707	43,500	A.
April	1,010	585	749	44,600	A.
May	680	520	605	37,200	A.
June	.....	.....	[a] 475	28,300	C.
July	428	374	393	24,200	A.
August	385	354	367	22,600	A.
September	417	354	358	21,300	A.
The year	1,010	354	497	360,000	

[a] Estimated.

LEWIS RIVER NEAR AMBOY, WASH.

LOCATION.—In sec. 36, T. 6 N., R. 3 E., at Cresaps ferry crossing on the county road from Amboy to Cougar, 1½ miles below Canyon Creek, 2 miles above Speilei Creek, and about 5 miles northwest of Amboy.

DRAINAGE AREA.—665 square miles (measured on map in Water-Supply Paper 253, p. 74, and checked on Forest Service map).

RECORDS AVAILABLE.—January 20, 1911, to September 30, 1914.

GAGE.—Inclined staff on left bank, replacing vertical staff at same location and datum.

DISCHARGE MEASUREMENTS.—Made from the ferry or from a boat about 30 feet above the gage prior to April 29, when a cable was installed 50 feet above gage.

CHANNEL AND CONTROL.—Gravel and small boulders; practically permanent.

EXTREMES OF STAGE.—Maximum stage recorded during year, 11.4 feet at 4 p. m., January 5; minimum stage recorded, 0.40 foot September 6.

Estimates withheld for additional data.

Discharge measurements of Lewis River near Amboy, Wash., for the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 31	F. F. Henshaw	1.22	1,680	Sept. 12	P. V. Hodges	0.58	1,020
Apr. 29	C. L. Batchelder	2.80	4,190				

Daily discharge, in second-feet, of Lewis River near Amboy, Wash., for the years ending Sept. 30, 1911–1914.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1911.									
1		2,780	1,300	5,120	4,200	7,430	2,320	910	770
2		2,470	1,300	4,650	4,650	6,620	2,320	910	770
3		2,180	1,250	4,420	6,620	5,600	2,180	875	805
4		2,180	1,300	4,200	11,400	4,880	2,180	840	910
5		1,910	1,450	3,630	10,200	4,650	2,320	910	990
6		1,790	1,560	3,450	8,000	4,200	2,470	990	990
7		1,790	1,790	3,110	6,620	4,420	2,180	990	910
8		1,790	2,040	2,940	6,360	4,200	1,910	910	910
9		1,670	2,320	3,280	5,600	4,200	1,790	910	1,030
10		1,670	2,180	4,000	5,600	4,200	1,790	910	1,300
11		1,790	2,180	3,810	4,650	4,420	1,670	875	1,250
12		1,670	2,180	3,450	4,880	5,850	1,560	910	990
13		1,910	2,040	3,110	6,100	5,600	1,670	910	990
14		1,790	2,180	2,780	5,600	5,120	1,670	875	1,030
15		1,670	2,470	2,780	5,600	5,120	1,670	840	1,790
16		1,560	3,110	2,780	5,120	4,650	1,560	840	3,110
17		1,560	3,280	2,620	6,100	4,200	1,560	840	2,470
18		1,450	3,450	3,280	11,400	3,450	1,450	875	2,040
19		1,670	3,450	3,110	10,500	3,450	1,350	910	1,670
20		1,560	4,200	3,110	8,600	3,110	1,300	910	1,300
21	2,780	1,560	4,650	3,450	7,430	2,940	1,250	910	1,250
22	2,470	1,560	4,650	3,630	6,620	2,780	1,250	875	1,160
23	2,320	1,450	5,850	3,810	5,120	2,780	1,160	805	1,070
24	2,320	1,450	5,850	4,650	5,600	2,470	1,160	770	990
25	2,180	1,450	5,600	5,600	5,600	2,470	1,160	770	990
26	2,180	1,350	5,120	5,600	4,650	2,470	1,160	735	990
27	1,910	1,300	4,200	4,650	4,650	2,780	1,070	700	910
28	1,910	1,300	3,630	4,200	4,650	2,780	1,070	700	950
29	1,790	.....	3,450	4,200	4,650	2,620	1,030	700	910
30	1,910	.....	3,810	4,000	5,360	2,470	990	770	910
31	2,470	.....	4,650	.....	6,620	.....	990	770	.....

Daily discharge, in second-feet, of Lewis River near Amboy, Wash., for the years ending Sept. 30, 1911–1914—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1911-12.												
1	910	910	3,280	2,180	8,300	3,110	2,940	4,880	4,420	2,040	1,910	4,420
2	910	875	3,110	2,320	7,160	3,110	3,450	4,650	4,420	2,180	1,910	3,810
3	910	875	2,780	2,180	6,100	2,780	3,450	4,650	4,200	2,180	1,910	3,810
4	1,030	910	2,470	2,040	5,600	2,470	3,450	4,200	3,630	2,040	1,910	3,450
5	1,070	1,070	2,780	2,040	5,600	2,470	3,450	4,200	4,200	1,910	1,910	2,940
6	990	1,250	4,200	2,040	5,120	2,470	3,280	4,000	4,200	1,790	1,790	2,780
7	990	4,200	3,810	1,910	4,650	2,320	3,280	4,200	4,200	1,910	1,670	2,940
8	990	3,810	4,200	2,180	5,120	2,320	3,450	5,600	4,200	1,910	1,910	4,420
9	1,070	3,450	5,600	2,620	9,530	2,470	3,810	6,360	4,200	1,790	1,250	4,200
10	1,200	2,780	5,120	3,280	12,400	2,180	4,420	6,100	4,200	1,670	1,250	3,630
11	1,200	2,470	4,650	2,780	11,400	2,180	4,420	5,600	3,810	1,560	1,200	3,280
12	1,160	2,470	4,650	12,100	9,840	2,180	3,810	5,850	3,450	1,560	1,070	2,940
13	1,160	4,200	4,200	18,400	8,300	2,040	3,630	6,100	3,810	1,450	1,070	2,470
14	1,160	13,800	3,810	22,300	7,710	2,040	3,450	6,620	4,420	1,560	1,030	2,320
15	1,160	7,710	4,000	14,800	8,300	2,180	3,450	7,160	3,810	1,560	1,070	2,180
16	1,250	6,100	4,650	10,800	13,400	2,470	3,890	6,890	3,450	1,560	1,670	1,910
17	1,160	7,710	3,810	8,600	14,100	2,470	3,110	5,600	2,940	1,450	2,180	1,910
18	1,160	10,200	3,630	7,160	14,100	2,780	3,110	5,120	2,780	1,400	2,180	1,790
19	1,120	12,700	3,810	6,360	10,800	2,620	3,110	5,120	3,110	1,400	1,560	1,790
20	1,030	10,200	3,630	5,600	8,910	2,470	2,780	5,850	3,450	1,400	1,300	1,670
21	990	7,710	3,450	5,600	7,430	2,320	2,780	5,850	3,450	1,350	1,250	1,450
22	990	6,620	3,280	5,360	6,620	2,320	2,780	5,120	2,940	1,350	1,250	1,350
23	990	5,600	4,200	5,120	6,100	2,320	2,780	5,120	2,780	1,350	1,160	1,250
24	990	4,650	3,630	5,360	5,120	2,470	2,780	6,360	2,780	1,450	1,200	1,250
25	910	4,880	3,450	10,800	4,650	2,470	2,780	4,200	2,940	1,670	1,200	1,250
26	950	5,120	3,280	10,200	4,200	2,470	2,780	5,120	2,780	1,790	1,200	1,250
27	910	4,650	3,450	10,200	3,810	2,780	2,780	8,300	2,620	1,790	1,160	1,250
28	875	4,200	3,280	12,100	3,630	2,940	3,110	7,160	2,320	1,910	1,070	1,250
29	875	4,000	3,110	11,100	3,450	2,940	4,420	6,100	2,040	1,910	990	1,300
30	840	3,450	2,780	12,700	.....	2,940	4,880	5,120	1,910	1,910	1,400	1,300
31	910	.....	2,470	10,200	.....	2,780	.....	5,850	.....	1,910	4,650	.....
1912-13.												
1	1,250	3,450	2,780	8,300	3,450	2,780	5,850	4,420	8,600	4,650	1,790	1,670
2	1,160	2,780	3,110	9,530	3,280	2,940	5,120	4,200	9,530	4,200	1,790	1,910
3	1,200	2,940	5,120	15,500	3,450	3,280	4,650	4,200	9,530	4,200	1,670	3,450
4	1,160	4,000	5,360	11,400	3,450	4,200	5,600	4,000	8,600	4,000	1,670	8,300
5	1,120	8,600	4,420	8,300	3,450	4,650	7,160	4,000	7,160	3,810	1,670	4,880
6	1,070	8,300	4,000	7,160	3,110	4,420	6,100	4,650	6,620	3,630	1,560	3,450
7	1,070	9,220	3,630	6,620	3,110	4,650	5,600	5,600	6,360	3,810	1,560	2,780
8	1,160	11,100	3,450	5,850	2,780	5,120	5,360	7,160	6,620	3,450	1,450	2,470
9	1,120	14,100	3,280	5,120	2,620	5,360	5,120	7,710	6,100	3,450	1,790	2,180
10	1,070	13,800	3,110	4,650	2,620	5,360	5,600	8,300	5,360	3,450	1,670	2,470
11	1,030	14,100	3,110	4,420	2,470	4,880	6,620	9,220	5,360	3,450	1,450	2,180
12	990	18,400	2,780	5,600	2,470	4,650	7,710	8,910	5,120	3,280	1,450	1,910
13	990	21,100	3,110	4,880	2,470	4,200	7,160	8,300	5,360	3,450	1,670	1,910
14	990	15,500	3,630	4,200	3,110	3,810	6,620	7,160	5,360	2,940	1,790	1,790
15	990	12,100	3,630	4,000	6,360	3,630	6,360	6,890	4,880	2,780	1,670	1,790
16	1,120	9,220	3,810	3,810	6,100	4,000	6,100	6,620	4,420	2,780	1,790	1,670
17	1,450	7,710	4,420	3,450	9,530	4,200	6,100	6,620	4,420	2,620	2,040	1,560
18	2,180	6,620	7,160	3,280	6,890	4,650	6,620	6,300	4,200	2,620	2,180	1,560
19	2,620	7,160	6,100	3,110	5,600	4,200	7,160	6,100	4,880	2,780	1,910	1,450
20	3,630	6,360	5,120	2,940	4,880	4,000	7,710	6,100	4,880	2,780	1,910	1,450
21	4,200	5,600	4,650	2,780	4,420	3,810	6,890	6,100	5,360	2,780	1,910	1,450
22	4,650	5,120	4,200	2,780	4,000	3,450	7,430	6,890	7,710	2,620	1,910	1,560
23	4,200	4,650	4,200	2,620	3,810	3,110	6,620	8,000	9,530	2,470	1,910	1,450
24	3,630	4,200	3,810	3,450	3,450	3,110	5,850	8,300	7,710	2,320	1,910	1,350
25	4,420	4,000	3,630	6,100	3,110	2,940	6,100	8,600	6,620	2,320	1,910	1,450
26	4,880	3,450	3,450	6,100	2,940	2,780	5,600	8,300	6,100	2,180	1,910	1,560
27	4,650	3,280	3,450	4,880	2,780	2,620	6,360	8,000	5,600	2,180	1,910	1,670
28	4,420	3,110	3,450	4,200	2,780	3,280	5,600	7,710	5,120	2,040	1,910	1,670
29	4,200	2,780	3,810	4,000	.....	8,910	5,360	6,890	4,420	2,040	1,910	1,670
30	3,810	3,110	12,100	3,810	.....	9,530	4,650	6,620	4,200	1,910	1,790	1,560
31	3,630	.....	11,400	3,630	.....	7,160	.....	7,160	.....	1,910	1,790	.....

Daily discharge, in second-feet, of Lewis River near Amboy, Wash., for the years ending Sept. 30, 1911–1914—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1913–14.												
1	1,450	2,180	7,710	3,630	7,710	11,800	3,810	4,880	4,650	2,620	1,350	990
2	1,450	2,470	6,620	4,200	6,100	9,840	4,200	5,360	4,880	2,470	1,300	950
3	1,450	2,180	6,100	4,650	5,600	8,300	5,600	6,620	4,420	2,470	1,300	950
4	1,670	2,040	4,880	12,100	4,880	7,160	6,100	6,100	3,810	2,470	1,250	950
5	1,910	2,320	4,200	34,100	3,810	6,620	7,160	5,850	3,450	2,040	1,250	910
6	2,320	4,200	4,200	27,100	3,630	6,360	6,620	5,360	3,280	2,040	1,250	910
7	2,470	4,650	3,810	25,500	3,450	6,360	6,360	5,120	3,630	2,040	1,250	910
8	1,910	4,200	3,450	19,900	3,110	6,100	5,850	5,360	3,280	1,910	1,250	1,120
9	2,320	3,810	3,450	13,100	3,450	5,850	6,100	5,600	3,110	1,910	1,200	1,120
10	2,780	3,630	3,280	10,800	3,450	5,600	7,710	5,600	3,110	1,790	1,200	1,070
11	4,200	3,450	3,450	8,910	4,200	5,600	7,710	5,360	2,940	1,790	1,200	1,070
12	3,450	3,280	3,280	7,710	5,120	5,360	7,430	5,360	3,110	1,790	1,200	1,070
13	5,120	3,110	3,450	7,430	5,600	5,600	7,710	6,620	3,280	1,790	1,200	1,030
14	4,880	2,940	3,630	7,160	5,120	6,360	8,300	6,890	3,280	1,670	1,200	1,160
15	4,420	2,780	3,810	6,890	4,200	7,430	12,100	7,160	3,450	1,670	1,160	1,670
16	3,810	3,110	3,630	7,160	4,000	7,160	10,800	7,160	3,810	1,670	1,160	2,320
17	3,630	4,650	3,810	6,890	3,450	7,160	8,910	6,360	3,810	1,670	1,160	2,180
18	3,110	4,650	3,450	6,360	3,450	6,890	7,710	5,600	3,450	1,560	1,120	2,470
19	2,780	4,650	3,280	6,100	3,280	6,890	6,890	6,100	3,110	1,560	1,120	5,120
20	3,110	4,420	3,110	5,600	3,110	6,620	7,160	5,850	2,940	1,560	1,070	4,000
21	2,780	4,200	2,780	7,160	4,880	6,360	6,360	5,120	2,780	1,560	1,070	3,110
22	2,470	6,620	2,780	13,400	7,430	6,100	6,100	5,600	2,780	1,450	1,070	2,620
23	2,180	12,100	2,620	12,700	6,360	5,600	5,120	5,360	2,620	1,450	1,070	2,180
24	2,180	14,400	2,470	10,500	8,300	5,360	4,650	5,120	3,630	1,450	1,070	1,910
25	2,180	9,530	2,620	8,910	7,430	4,880	4,650	5,120	3,280	1,400	1,070	1,790
26	1,910	9,530	2,470	8,300	6,100	4,650	4,200	4,880	2,940	1,350	1,070	1,910
27	1,910	9,840	2,470	7,430	10,200	4,650	4,420	4,420	2,620	1,350	1,030	1,910
28	1,790	9,530	2,780	6,360	8,600	4,200	4,420	4,200	2,620	1,350	1,030	1,790
29	1,670	10,200	2,470	6,890	.....	4,200	4,200	3,810	2,780	1,350	1,030	1,670
30	1,670	8,910	2,470	7,160	.....	4,200	4,200	4,200	2,620	1,350	990	1,670
31	1,910	.....	3,280	6,620	.....	4,200	.....	4,420	.....	1,350	990	.....

NOTE.—Discharge determined from a rating curve well defined between 900 and 14,000 second-feet; above 5,000 second-feet curve is defined by measurements made in 1916.

Monthly discharge of Lewis River near Amboy, Wash., for the years ending 1911–1914.

[Drainage area, 665 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
1911.							
January 21–31	2,780	1,790	2,200	3.31	1.35	48,000	B.
February	2,780	1,300	1,720	2.59	2.70	95,500	B.
March	5,850	1,250	3,110	4.68	5.40	191,000	A.
April	5,600	2,620	3,780	5.68	6.34	225,000	A.
May	11,400	4,200	6,410	9.64	11.11	394,000	A.
June	7,430	2,470	4,060	6.11	6.82	242,000	A.
July	2,470	990	1,590	2.39	2.76	97,800	A.
August	990	700	853	1.28	1.48	52,400	B.
September	3,110	770	1,210	1.82	2.03	72,000	A.
The period	.....	.....	.....	.....	.....	1,420,000	
1911–12.							
October	1,250	840	1,030	1.55	1.79	63,300	A.
November	13,800	875	4,950	7.44	8.30	295,000	A.
December	5,600	2,470	3,700	5.56	6.41	228,000	A.
January	22,300	1,910	7,430	11.2	12.91	457,000	A.
February	14,100	3,450	7,640	11.5	12.40	439,000	A.
March	3,110	2,040	2,510	3.77	4.35	154,000	A.
April	4,880	2,780	3,370	5.07	5.66	201,000	A.
May	8,300	4,000	5,580	8.39	9.67	343,000	A.
June	4,420	1,910	3,450	5.19	5.79	205,000	A.
July	2,180	1,350	1,700	2.56	2.95	105,000	A.
August	4,650	990	1,560	2.35	2.71	95,900	A.
September	4,420	1,250	2,390	3.59	4.00	142,000	A.
The year	22,300	840	3,760	5.65	76.94	2,730,000	

Monthly discharge of Lewis River near Amboy, Wash., for the years ending 1911–1914—Continued.

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
1912–13.							
October	4,880	990	2,390	3.59	4.14	147,000	A.
November	21,100	2,780	7,860	11.8	13.17	468,000	A.
December	12,100	2,780	4,490	6.75	7.78	276,000	A.
January	15,500	2,620	5,370	8.08	9.32	330,000	A.
February	9,530	2,470	3,870	5.82	6.06	215,000	A.
March	9,530	2,620	4,380	6.59	7.60	269,000	A.
April	7,710	4,650	6,160	9.26	10.33	367,000	A.
May	9,220	4,000	6,740	10.1	11.64	414,000	A.
June	9,530	4,200	6,190	9.31	10.39	368,000	A.
July	4,650	1,910	3,000	4.51	5.20	184,000	A.
August	2,180	1,450	1,780	2.68	3.09	109,000	B.
September	8,300	1,350	2,210	3.32	3.70	132,000	B.
The year	21,100	990	4,530	6.81	92.42	3,280,000	
1913–14.							
October	5,120	1,450	2,610	3.92	4.52	160,000	B.
November	14,400	2,040	5,450	8.20	9.15	324,000	A.
December	7,710	2,470	3,610	5.43	6.26	222,000	A.
January	34,100	3,630	10,300	15.5	17.87	633,000	B.
February	10,200	3,110	5,220	7.85	8.17	290,000	A.
March	11,800	4,200	6,240	9.38	10.81	384,000	A.
April	12,100	3,810	6,420	9.65	10.77	382,000	A.
May	7,160	3,810	5,500	8.27	9.53	338,000	A.
June	4,880	2,620	3,320	4.99	5.57	198,000	A.
July	2,620	1,350	1,740	2.62	3.02	107,000	A.
August	1,350	990	1,150	1.73	1.99	70,700	A.
September	5,120	910	1,750	2.63	2.93	104,000	A.
The year	34,100	910	4,440	6.68	90.59	3,210,000	

COWLITZ RIVER BASIN.

OHANAPECOSH RIVER NEAR LEWIS, WASH.

LOCATION.—In sec. 29, T. 14 N., R. 10 E. Willamette meridian, above Clear Fork and 7 miles northeast of Lewis, in Lewis County.

DRAINAGE AREA.—116 square miles (measured on Plate I, Water-Supply Paper 313).

RECORDS AVAILABLE.—August 19, 1907, to January 12, 1913; April 14, 1913, to September 30, 1914.

GAGE.—Vertical staff spiked to an overhanging tree on left bank, 900 feet above Clear Fork; read to hundredths once each day, for which record is published during the year ending September 30, 1914, by Chas. L. Hall, October 1 to November 28, by E. H. Frank, November 30 to March 31, and by J. L. Jennings, April 3 to September 30. Levels run September 9, 1913, showed gage to be 0.06 foot too low; change probably due to settling; as date of settling is uncertain previously published gage heights have not been corrected. Gage washed out January 5 and reset by observer January 13, 1914.

DISCHARGE MEASUREMENTS.—Made from cable 30 feet below gage or by wading.

CHANNEL AND CONTROL.—Composed of gravel and small bowlders which shift at high stages; one channel at all stages; banks do not overflow. Zero flow will occur at about gage height −0.5 foot, as determined October 3, 1914.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.0 feet (estimated by observer) at 11.35 a. m. January 5 (discharge 5,480 second-feet); minimum stage recorded, 0.49 foot at 11 a. m. October 5 (discharge 98 second-feet); 1907–1914: Maximum stage recorded, water over gage (0 to 8.0 feet) November 23, 1909 (estimated discharge 7,500 second-feet); minimum stage recorded, 0.2 foot September 26 and October 6, 1908 (discharge not determined).

WINTER FLOW.—Discharge relation not seriously affected by ice; open-channel rating curve assumed applicable.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Gage-height record reliable; rating curve fairly well defined below 900 second-feet. Considerable diurnal fluctuation March to June. Results fair below and approximate above 1,000 second-feet.

The following discharge measurement was made by I. L. Collier:
June 14, 1914, gage height, 2.61 feet; discharge, 964 second-feet.

Daily discharge, in second-feet, of Ohanapecosh River near Lewis, Wash., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	116			159						830		
2		259	405		234	610						110
3	109			159			347		1,500			
4		231	327		220	409		1,220				
5	98			5,480							194	
6		405	291		207	351	715					
7	159											
8		385	245		182	351				515		112
9	138						770	1,080				100
10		535	231		182	351			471			
11	490											
12		405	231		194	370					170	
13	920			515			1,290	1,500				
14		327	231		194	688			770			
15	490			409						389		
16		346	231		194	770	1,220					138
17	405			370								
18		490	218		182	742						
19	385			315							138	
20		405	205		182	770	1,360	1,290				
21	490			281						249		
22		365	193		234	660						194
23	405			429								
24		920	170		281	515	715		660			
25	445			333								
26		630	159		265						126	
27	365			298		370	660	830				
28		580	159		429							
29	259			265		315				192		138
30		490	146				515					
31	259			265		308						

NOTE.—Discharge determined from a well-defined rating curve. Discharge estimated Jan. 5.

COWLITZ RIVER AT LEWIS, WASH.

LOCATION.—In sec. 15, T. 13 N., R. 9 E. Willamette meridian, at Lewis ferry, about 1 mile northeast of Lewis, 1½ miles below Lake Creek, in Lewis County.

DRAINAGE AREA.—275 miles (measured on Plate I, Water-Supply Paper 313).

RECORDS AVAILABLE.—July 1, 1911, to September 30, 1914.

GAGE.—Original gage installed by the Valley Development Co., on left bank 150 feet below Lewis ferry, August 15, 1907; data prior to July 1, 1911, insufficient for estimates of discharge. Gage washed out November 20, 1911, but was replaced at same location and approximately the same datum November 27, 1911. During the year ending September 30, 1914, gage read to hundredths twice each day for which record is published October 1 to April 16, and once each day thereafter; by Chas. L. Hall, October 1 to November 28; by E. H. Frank, November 30 to March 31; by J. L. Jennings, April 3 to September 30. Datum of gage heights for year ending September 30, 1913, is 0.07 foot lower than correct datum because gage heights for that year were not corrected.

DISCHARGE MEASUREMENTS.—Made from cable at the gage or by wading.

CHANNEL AND CONTROL.—Bed of stream composed of gravel and sand; likely to shift; right bank may overflow at extreme high stages; control is a gravel and bowlder riffle 300 feet below gage. According to determination October 2, 1914, zero flow would occur at gage height −0.2 foot, ±0.2.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.0 feet at 2.15 p. m. January 5 (discharge, 13,100 second-feet); minimum stage recorded, 0.93 foot at 8.50 a. m. and 1 p. m. October 5 (discharge, 378 second-feet).

1911–1914: Maximum stage recorded, 7.35 feet November 19, 1911 (discharge not computed; gage washed out on following day); minimum stage recorded, 0.95 foot October 30 to November 3, 1911 (discharge, 285 second-feet).

WINTER FLOW.—Discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Gage-height record reliable; rating curve fairly well defined below 2,000 second-feet. Considerable diurnal fluctuation March to June. Results fair below and approximate above 2,000 second-feet.

The following discharge measurement was made by I. L. Collier:
June 11, 1914, gage height, 2.07 feet; discharge, 1,350 second-feet.

Daily discharge, in second-feet, of Cowlitz River at Lewis, Wash., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	452			491						1,900	958	
2		823	1,160		912	1,760						588
3	518			518			1,020		3,230			
4		740	1,010		866	1,270		2,370				
5	378			12,500							866	452
6		1,270	912		780	1,060	1,760					
7	588			9,270								
8		1,220	823		740	1,110				1,500	740	484
9	484			2,870			1,760	1,900				420
10		1,440	740		732	1,160			1,270			
11	2,370			1,900					1,330			452
12		1,010	740		740	1,160					823	390
13	2,370			1,440			2,530	2,870				
14		912	780		740	1,760						
15	1,440			1,270						1,900	912	
16		958	700		740	2,050	2,870					624
17	1,110			1,160								
18		1,330	662		740	1,900			1,440			662
19	1,160			1,010							700	
20		1,110	588		780	1,900	3,230	2,530				
21	1,330			1,010						1,010		
22		1,060	588		958	1,630					662	740
23	1,110			1,440								
24		2,050	518		1,060	1,440	1,760		1,570			
25	1,220			1,220								
26		1,630	484		1,010			1,900			662	624
27	1,060			1,110		1,060	1,500					
28		1,440	484		1,440							
29	866			1,010		912				832	610	588
30		1,440	433				1,330					
31	780			958		832						

NOTE.—Discharge determined from a well-defined rating curve.

COWLITZ RIVER AT MOSSY ROCK, WASH.

LOCATION.—In sec. 1, T. 12 N., R. 2 E., at county highway bridge 1 mile north of Mossy Rock, 2½ miles above Tilton River, in Lewis County.

DRAINAGE AREA.—1,170 square miles (measured on Pl. I, Water-Supply Paper 313).

RECORDS AVAILABLE.—January 1, 1912, to September 30, 1914 (fragmentary).

GAGE.—Since September 18, 1913, vertical staff on left bank, in 3 sections, 0 to 39 feet; read once a day to nearest tenth of a foot by George W. Jerrells. From January 1, 1912, to September 17, 1913, a chain gage attached to downstream handrail of county bridge at a datum different from that of present gage.

DISCHARGE MEASUREMENTS.—Made from highway bridge, with a stayline.

CHANNEL AND CONTROL.—Channel above and below gage is a deep canyon with basalt walls which are almost vertical. Control is a broad riffle 450 feet below gage, composed of sand, gravel, and bowlders which shift at high stages. Zero flow would occur at gage height approximately −0.9 foot.

EXTREMES OF DISCHARGE.—1912–1914: Maximum stage recorded, 18.0 feet January 7 and 8, 1914 (discharge, 30,300 second-feet). Flood of November, 1906, as determined by leveling from high-water marks pointed out by residents reached a gage height of about 29.4 feet (present staff gage datum; discharge approximately 51,000 second-feet); minimum stage recorded, 2.0 feet September 7–13 and September 24 and 25, 1914 (discharge, 975 second-feet).

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Gage height record not considered very reliable prior to June, 1914, and only fairly reliable thereafter. Practically no diurnal fluctuation. Results poor prior to June, 1914, and fair thereafter.

Discharge measurements of Cowlitz River at Mossy Rock, Wash., for the period July 9, 1911, to Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1911.		*Feet.*	*Sec.-ft.*	1913.		*Feet.*	*Sec.-ft.*
July 9	G. L. Parker	[a] 3.8	4,330	Sept. 4	James E. Stewart	5.36	6,110
Oct. 17	do	[a] 1.53	1,490	5	do	5.50	6,580
1912.				18	do	[b] 2.34	1,940
Nov. 20	James E. Stewart	5.40	7,730	1914.			
1913.				June 20	J. L. Collier	4.93	4,880
Mar. 6	do	3.11	3,450	20	do	4.90	4,910
7	do	3.14	3,470	30	do	4.29	3,560
Sept. 4	do	4.18	4,680	July 1	do	4.23	3,700

[a] From reference points whose gage datum was afterwards determined.
[b] Readings on staff gage 2.20 feet.

NOTE.—Gage heights for 1911, 1912, and 1913 are referred to chain gage; those for 1914 to the staff gage.

Daily discharge, in second-feet, of Cowlitz River at Mossy Rock, Wash., for the years ending Sept. 30, 1912–1914.

Day.	Jan.	Feb.	Mar.	Apr.	June.	July.	Day.	Jan.	Feb.	Mar.	Apr.	June.	July.
1912.							1912.						
1	2,850	10,000	4,090	2,210	.....	4,480	16	15,500	10,000	2,720	4,390	.....	.....
2	2,720	9,190	3,800	2,460	.....	4,690	17	14,500	9,700	2,720	4,090	.....	.....
3	2,590	8,850	3,520	3,240	.....	4,690	18	13,800	9,700	2,720	4,090	.....	.....
4	2,590	8,850	3,520	3,240	.....	4,240	19	11,700	9,700	2,460	3,800	.....	4,090
5	2,590	9,020	3,520	3,240	.....	4,090	20	10,000	9,360	2,460	3,800	.....	.....
6	2,590	9,020	3,240	3,520	.....	4,090	21	9,190	9,190	2,460	.....	.....	.....
7	2,590	8,850	3,240	3,520	.....	.....	22	8,850	8,850	2,460	.....	.....	.....
8	2,850	8,850	3,240	3,520	.....	.....	23	9,360	8,000	2,210	.....	.....	.....
9	2,590	8,850	3,240	4,090	.....	.....	24	10,000	7,150	2,210	.....	.....	.....
10	2,590	10,200	3,240	4,090	.....	.....	25	10,900	6,980	2,210	.....	.....	.....
11	4,090	10,600	3,240	4,390	.....	.....	26	11,400	6,300	2,210	.....	.....	.....
12	8,340	11,400	2,980	4,390	.....	.....	27	11,400	5,160	2,210	.....	.....	.....
13	13,300	11,400	2,980	4,390	.....	4,090	28	10,700	5,000	1,970	.....	.....	.....
14	18,200	10,600	2,980	4,390	.....	.....	29	10,600	4,690	1,970	.....	.....	.....
15	17,400	10,600	2,720	4,390	.....	.....	30	10,600	.....	1,970	.....	4,840	.....
							31	10,400	.....	1,970	.....	.....	.....

Daily discharge, in second-feet, of Cowlitz River at Mossy Rock, Wash., for the years ending Sept. 30, 1912–1914—Continued.

Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1912–13.								
1	.....	5,160	.....	4,540	3,940	4,690	7,150	15,600
2	.....	5,160	.....	4,390	3,940	4,240	6,470	16,300
3	.....	5,000	.....	4,240	3,940	4,090	5,480	17,200
4	.....	5,000	.....	3,940	3,800	3,800	5,800	18,700
5	.....	5,000	9,190	3,940	3,660	4,840	6,300	17,700
6	.....	.....	9,190	3,660	3,380	4,690	6,470	15,500
7	.....	.....	9,360	3,380	4,090	4,690	10,600	12,400
8	.....	.....	8,850	3,520	4,090	4,240	12,400	14,100
9	.....	.....	8,340	3,240	4,090	4,240	10,200	13,600
10	.....	.....	7,320	3,240	4,090	4,840	10,600	10,900
11	.....	.....	6,470	3,240	4,090	5,480	10,400	10,700
12	.....	.....	6,470	3,520	4,390	6,300	9,870	10,500
13	.....	.....	6,300	4,090	4,090	7,150	11,100	10,200
14	.....	.....	5,800	4,840	4,090	7,150	10,900	9,170
15	.....	.....	5,480	7,150	3,800	7,830	8,000	9,170
16	.....	.....	4,840	6,470	3,800	8,000	7,660	9,510
17	.....	.....	4,690	6,470	3,800	8,000	7,490	9,170
18	.....	.....	3,940	6,300	3,800	8,000	7,660	9,680
19	.....	.....	3,940	5,800	3,800	8,170	7,490	9,510
20	6,980	.....	3,800	5,800	3,800	8,340	8,170	9,170
21	6,980	.....	3,660	5,960	3,800	8,000	11,400	9,000
22	6,980	.....	3,520	5,800	3,800	8,000	12,100	9,850
23	6,980	.....	3,520	4,840	3,380	7,660	12,400	10,700
24	6,640	.....	3,380	4,690	3,380	7,660	13,100	10,500
25	6,300	.....	3,520	4,540	2,850	8,170	13,100	9,170
26	5,960	.....	6,130	4,240	2,850	8,850	14,100	8,830
27	5,800	.....	5,640	3,940	3,240	8,850	14,500	8,830
28	5,480	.....	5,480	4,090	3,520	9,360	15,500	8,660
29	5,480	.....	5,160	.....	3,520	8,680	14,800	8,490
30	5,320	.....	5,000	.....	4,690	8,510	14,300	8,490
31	.....	.....	3,520	.....	4,690	.....	14,800	.....

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1913–14.												
1	.....	2,420	5,750	2,040	4,640	5,540	3,790	6,440	4,640	3,630	1,740	1,320
2	.....	2,420	5,570	2,040	4,300	5,360	3,960	7,560	4,300	3,790	1,740	1,220
3	.....	2,690	5,390	2,420	4,130	5,360	4,300	8,660	4,300	3,630	1,740	1,220
4	.....	2,830	5,030	3,720	3,960	5,180	4,470	8,300	4,130	3,630	1,630	1,220
5	.....	3,560	4,520	24,800	3,960	5,180	4,470	8,110	4,130	3,310	1,630	1,220
6	.....	3,880	4,040	28,500	3,470	5,180	5,000	7,920	3,960	3,010	1,520	1,220
7	.....	3,880	3,880	30,300	3,310	5,180	6,630	7,560	3,790	2,730	1,520	975
8	.....	3,880	3,720	30,300	3,310	5,180	6,820	7,180	3,630	2,590	1,520	975
9	.....	3,720	3,720	23,500	3,160	5,180	7,180	6,820	3,630	2,460	1,520	975
10	.....	3,560	3,720	19,800	3,160	5,180	7,920	7,000	3,630	2,210	1,520	975
11	.....	3,560	3,720	12,400	3,010	5,180	8,300	7,180	3,790	2,330	1,520	975
12	.....	3,410	3,560	9,780	3,010	5,360	8,660	7,180	3,960	2,460	1,520	975
13	1,690	3,260	3,260	6,820	2,870	5,360	10,500	8,300	3,960	2,460	1,520	975
14	4,520	3,110	3,260	5,900	2,870	5,540	11,300	9,400	4,300	2,330	1,520	1,050
15	3,880	2,970	3,260	5,000	2,870	6,820	12,000	11,100	4,640	2,330	1,520	1,140
16	3,110	2,970	2,970	5,000	2,870	7,370	12,000	10,900	5,000	2,210	1,520	1,140
17	3,110	2,970	2,970	4,300	3,010	7,370	11,600	10,700	5,720	2,210	1,520	1,320
18	3,260	2,970	2,970	4,300	3,010	7,370	11,300	9,780	5,360	2,210	1,520	1,520
19	3,410	3,880	2,690	4,130	3,010	7,370	8,660	8,660	5,000	2,090	1,520	1,520
20	3,410	4,200	2,550	3,790	3,010	7,370	8,660	7,560	4,820	1,970	1,520	1,420
21	3,560	4,520	2,420	3,960	3,010	7,370	8,480	7,740	4,300	1,970	1,520	1,320
22	3,560	4,860	2,420	5,720	3,310	7,370	8,300	8,300	3,960	1,860	1,420	1,220
23	3,560	4,860	2,290	5,900	3,310	7,370	8,300	8,300	3,310	1,860	1,420	1,140
24	3,720	4,860	2,040	6,080	3,470	7,370	8,110	7,560	3,310	1,860	1,420	975
25	3,720	4,860	2,040	6,080	3,790	7,370	8,110	6,440	3,960	1,860	1,420	975
26	3,410	4,860	2,040	6,080	3,790	5,000	7,920	6,080	3,960	1,740	1,320	1,050
27	2,970	5,750	2,040	5,900	5,000	5,180	7,560	5,720	3,960	1,740	1,320	1,140
28	2,970	7,740	2,040	5,540	5,540	5,540	7,370	5,000	3,960	1,740	1,320	1,320
29	2,690	7,190	2,040	5,000	.....	4,300	7,370	4,640	3,960	1,740	1,320	1,220
30	2,420	6,290	2,040	4,640	.....	3,960	7,180	4,640	3,790	1,740	1,320	1,140
31	2,420	.....	2,040	4,640	.....	3,630	.....	4,470	.....	1,740	1,320	.....

NOTE.—Discharge determined from rating curves, well defined between 1,500 and 12,000 second-feet, fairly well defined below 1,500 second-feet, and poorly defined above 16,000 second-feet, applicable as follows: Jan. 1, 1912, to June 4, 1913, June 5 to Sept. 17, 1913, Sept. 18, 1913, to Jan. 8, 1914, and Jan. 9 to Sept. 30, 1914.

Monthly discharge of Cowlitz River at Mossy Rock, Wash., for 1912–1914.

[Drainage area, 1,170 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
1912.							
January	18,200	2,590	8,610	7.36	8.48	529,000	C.
February	11,400	4,690	8,830	7.55	8.14	508,000	C.
March	4,090	1,970	2,790	2.38	2.74	172,000	C.
April 1–20	4,390	2,210	3,760	3.21	2.39	149,000	C.
The period						1,360,000	
1912–13.							
November 20–30	6,980	5,320	6,260	5.35	2.19	137,000	C.
December 1–5	5,160	5,000	5,060	4.32	.80	50,200	C.
January 5–31	9,360	3,380	5,650	4.83	4.85	303,000	C.
February	7,150	3,240	4,640	3.97	4.13	258,000	C.
March	4,690	2,850	3,810	3.26	3.76	234,000	C.
April	9,360	3,800	6,750	5.77	6.44	402,000	C.
May	15,500	5,480	10,300	8.80	10.14	633,000	C.
June	18,700	8,490	11,400	9.74	10.87	678,000	C.
1913–14.							
October 13–31	4,520	1,690	3,230	2.76	1.95	122,000	C.
November	7,740	2,420	4,060	3.47	3.87	242,000	C.
December	5,750	2,040	3,230	2.76	3.18	199,000	C.
January	30,300	2,040	9,300	7.95	9.16	572,000	C.
February	5,540	2,870	3,510	3.00	3.12	195,000	C.
March	7,370	3,630	5,870	5.02	5.79	361,000	C.
April	12,000	3,790	7,870	6.73	7.51	468,000	C.
May	11,100	4,470	7,590	6.49	7.48	467,000	C.
June	5,720	3,310	4,170	3.56	3.97	248,000	B.
July	3,790	1,740	2,370	2.03	2.34	146,000	B.
August	1,740	1,320	1,500	1.28	1.48	92,200	B.
September	1,520	975	1,160	.992	1.11	69,000	B.
The period						3,180,000	

CLEAR FORK NEAR LEWIS, WASH.

LOCATION.—In sec. 29, T. 14 N., R. 10 E., above Yakima trail bridge, 1,000 feet above mouth and about 7 miles northeast of Lewis, in Lewis County.

DRAINAGE AREA.—48 square miles (measured on Pl. I, Water Supply Paper 313).

RECORDS AVAILABLE.—August 20, 1907, to September 30, 1914.

GAGE.—Vertical staff, on right bank, 350 feet above Yakima trail bridge. Gage washed out several times prior to 1912, but was replaced at same location and approximately the same datum. Relation of present datum to that maintained prior to 1912 rather uncertain. Gage read to hundredths once each day, for which record is published during the year ending September 30, 1914; by Chas. E. Hall, October 1 to November 28; by E. H. Frank, November 30 to March 31, and by J. L. Jennings, April 3 to September 30.

DISCHARGE MEASUREMENTS.—Made from cable at gage or by wading.

CHANNEL AND CONTROL.—Composed of gravel and bowlders which shift during floods. One channel at all stages. Zero flow would occur at gage height −1.0 foot, ±0.1 foot, as determined September 9, 1913.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.94 feet at 11.25 a. m. January 5 (discharge, 1,450 second-feet); minimum stage recorded, 0.73 foot September 2 and 8 (discharge, 83 second-feet).

Maximum stage recorded, 1907–1914: 7.3 feet November 23, 1909 (discharge, 2,530 second-feet); minimum stage recorded, 0.05 foot October 4, 17–19, 23, 27–28, and 30, 1909 (discharge, 49 second-feet).

WINTER FLOW.—Discharge relation not seriously affected by ice; open channel rating curve assumed applicable.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Gage-height record reliable; considerable diurnal fluctuation March to June.

The following discharge measurement was made by I. L. Collier:
June 14, 1914, gage height, 2.17 feet; discharge, 358 second-feet.

Daily discharge, in second-feet, of Clear Fork near Lewis, Wash., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	103			104						300		
2		184	239		133	288						85
3	103			106			165		492			
4		173	216		126	212		304				
5	89			1,440							113	
6		263	194		120	183	300					
7	153			960								
8		251	173		107	192				222		85
9	135			492			300	304				85
10		288	153		107	183			232			
11	300			324								
12		239	153		113	192					107	
13	366			254			432	524				
14		194	163		113	380			350			
15	313			212						202		
16		194	153		107	376	579					120
17	263			192								
18		288	144		107	350						
19	239			165							101	
20		251	135		107	350	492	432				
21	300			165						140		
22		239	126		133	324						126
23	239			243								
24		366	118		140	265	324		265			
25	276			192								
26		326	118		133	202					88	
27	239			165			265	350				
28		313	110		212	183						
29	184			148						120		101
30		288	103			176	243					
31	173			148								

NOTE.—Discharge determined from a rating curve well defined below 500 second-feet.

COAL CREEK AT MOUTH, NEAR LEWIS, WASH.

LOCATION.—In sec. 6, T. 13 N., R. 10 E., at Yakima trail bridge, half a mile above the mouth, and about 4 miles northeast of Lewis, in Lewis County.

DRAINAGE AREA.—Approximately 10 square miles, as measured on Plate I, Water-Supply Paper 313.

RECORDS AVAILABLE.—November 6, 1910, to January 20, 1913, and April 12, 1913, to September 30, 1914.

GAGE.—Vertical staff nailed to large stump on left bank, 10 feet above Yakima trail bridge. Gage read to hundredths; by Chas. R. Hall, October 1 to November 28; by E. H. Frank, November 30 to March 31, and by J. L. Jennings, April 3 to September 30.

DISCHARGE MEASUREMENTS.—Made by wading near gage and from Yakima trail bridge.

CHANNEL AND CONTROL.—One channel at all stages; composed of large boulders mixed with gravel and sand which shifts during floods. Zero flow would occur at gage height −0.1 foot +0.2 as determined October 3, 1914.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.15 feet at 10.05 a. m., January 5, (discharge, 332 second-feet); minimum stage recorded, 0.70 foot at 9.50 a. m. October 5 (discharge, 5 second-feet). 1910–1914: Maximum stage recorded, 3.6 feet, November 19, 1911 (discharge 420 second-feet); minimum stage recorded, 0.50 foot (gage reading probably incorrect), September 8, 1911 (discharge, 0.5 second-foot).

WINTER FLOW.—Discharge relation not seriously affected by ice; open channel rating curve assumed applicable.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Gage-height record apparently reliable. Considerable diurnal fluctuation March to June, results approximate.

The following discharge measurement was made by I. L. Collier:
June 14, 1914, gage height, 1.62 feet; discharge, 68.6 second-feet.

Daily discharge, in second-feet, of Coal Creek at mouth, near Lewis, Wash., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	9.0			20								
2		37	70		25	80				32		7.0
3	8.6			21			40		87			6.0
4		31	54		24	53		94				
5	5.0			332							11.4	
6		59	54		22	42	87					
7	36			238								
8		48	48		18	62				24		8.0
9	22			115			84	107				9.3
10		76	43		18	60			40			
11	80			74								
12		70	43		22	59					9.0	
13	120			52			109	108				
14		48	44		22	77			64			
15	82			40						19		
16		48	40		22	101	127					15
17	59			35								
18		70	35		23	101						
19	54			27							8.6	
20		70	30		24	101	115	87				
21	76			26						15		
22		64	28		35	86						17
23	59			54								
24		107	24		40	62	72		68			
25	59			37								
26		82	22		34						8.0	
27	48			32		40	52	62				
28		70	22		60							
29	38			28		35				10.8		10.5
30		76	18			52						
31	36			27		29						

NOTE.—Discharge determined from a poorly defined rating curve.

LAKE CREEK AT OUTLET OF PACKWOOD LAKE, NEAR LEWIS, WASH.

LOCATION.—In sec. 21, T. 13 N., R. 10 E. Willamette meridian, below outlet of Packwood Lake and 5 miles east of Lewis, in Lewis County.

DRAINAGE AREA.—18 square miles (approximately; measured on Pl. I, Water-Supply Paper 313).

RECORDS AVAILABLE.—September 2, 1911, to September 30, 1914.

GAGE.—Vertical staff, 500 feet below outlet of Packwood Lake, spiked to cedar tree on right bank, 32 feet upstream from weir; read twice a day, to hundredths, by J. L. Jennings. Zero of gage set at same elevation as weir crest.

DISCHARGE MEASUREMENTS.—Made by wading 5 feet above weir crest.

CHANNEL AND CONTROL.—A rectangular weir 19.94 feet long with a crest 1 inch wide, forms control; overflow occurs at gage height 4.4 feet.

EXTREMES OF DISCHARGE.—1911–1914: Maximum stage recorded, 3.26 feet at 6 p. m. June 3, 1913, and 6 a. m., June 4, 1913 (discharge, 465 second-feet); minimum stage recorded, 0.57 foot October 30, to November 4, 1911 (discharge, 40 second-feet).

WINTER FLOW.—Discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Gage-height record very reliable; practically no diurnal fluctuation and results excellent between 50 and 200 second-feet, except for short intervals when there may have been a small amount of leakage under weir.

The following discharge measurement was made by I. L. Collier:
June 17, 1914, gage height 1.92 feet; discharge, 196 second-feet.

Daily discharge, in second-feet, of Lake Creek at outlet of Packwood Lake, near Lewis, Wash., for the period Sept. 21, 1911, to Sept. 30, 1914.

Day.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1911-12.													
1	.....	50	40	111	61	136	75	52	63	163	163	111	130
2	.....	52	40	99	59	123	72	52	63	163	149	105	123
3	.....	51	40	94	59	117	70	54	63	170	136	105	111
4	.....	50	40	88	57	111	68	55	64	170	130	99	99
5	.....	49	42	83	59	105	67	57	64	194	130	94	88
6	.....	49	42	83	60	105	66	57	64	229	130	94	88
7	.....	48	54	83	62	105	64	57	64	284	130	88	88
8	.....	48	66	83	59	105	63	57	68	324	123	99	94
9	.....	46	73	88	61	117	62	57	88	324	123	99	94
10	.....	48	68	94	61	136	61	61	111	304	130	105	111
11	.....	48	66	94	60	142	60	63	117	284	142	111	83
12	.....	48	64	94	68	142	59	64	130	265	149	105	78
13	.....	48	66	94	78	130	58	64	149	284	156	99	78
14	.....	50	78	94	123	123	56	64	186	284	149	99	73
15	.....	53	78	88	142	123	57	64	229	265	149	105	68
16	.....	52	78	88	142	136	57	64	229	211	156	111	65
17	.....	52	94	83	130	149	57	63	211	194	163	117	64
18	.....	51	117	78	117	163	59	61	202	194	178	111	63
19	.....	50	247	78	105	149	59	60	202	229	178	99	61
20	.....	48	304	78	99	136	59	59	238	284	170	99	59
21	73	48	284	73	105	123	57	59	265	284	163	94	59
22	73	46	211	73	105	111	55	59	238	247	149	94	59
23	68	45	163	73	99	111	52	59	212	229	142	94	57
24	64	43	142	73	99	105	50	56	186	247	130	88	57
25	61	43	130	73	111	99	50	59	186	284	123	88	55
26	59	42	142	68	123	88	50	58	202	304	117	88	54
27	57	42	136	68	123	88	50	58	229	284	111	83	52
28	54	40	130	67	130	83	50	59	229	247	105	78	51
29	52	40	117	66	136	78	52	59	211	202	105	73	50
30	52	40	117	65	149	.....	52	61	186	178	105	73	50
31	.....	40	.....	64	142	.....	52	.....	170	.....	111	111	.....

Daily discharge, in second-feet, of Lake Creek or outlet of Packwood Lake, near Lewis, Wash., for the period Sept. 21, 1911, to Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1912–13.												
1	51	48	59	88	66	66	57	88	324	265	149	83
2	51	48	59	88	64	65	60	83	408	247	156	73
3	52	48	63	130	66	64	59	83	452	229	156	83
4	53	48	68	142	64	61	58	83	452	211	156	99
5	52	48	66	136	63	60	59	78	386	202	149	136
6	50	48	63	123	63	59	59	78	344	202	142	123
7	50	50	63	117	60	59	59	88	344	229	136	105
8	51	52	62	99	59	59	57	105	408	211	136	99
9	50	66	59	88	57	59	55	142	284	211	136	99
10	50	73	59	83	55	59	54	170	324	229	130	88
11	49	78	59	88	55	59	52	186	284	229	123	83
12	48	94	59	88	54	60	54	178	265	229	117	78
13	48	117	61	83	54	63	57	163	284	229	117	73
14	47	123	59	78	52	61	59	149	284	211	94	68
15	46	111	59	73	58	59	61	156	265	186	99	68
16	45	99	61	68	64	61	63	136	229	170	94	66
17	50	94	64	66	73	61	65	136	211	163	88	66
18	50	88	66	68	77	63	63	130	202	163	88	66
19	52	88	64	68	77	63	68	123	229	178	88	65
20	52	83	64	68	76	62	73	123	265	202	83	66
21	51	78	62	78	74	59	78	123	265	229	80	66
22	52	78	61	94	72	58	83	136	304	265	83	67
23	52	73	59	78	70	58	88	136	408	284	88	63
24	52	73	61	78	72	58	88	194	408	284	94	59
25	52	68	59	78	66	57	88	229	365	265	94	56
26	51	66	58	78	68	57	88	265	324	247	94	52
27	50	65	55	78	68	55	94	304	304	211	88	52
28	50	64	59	73	66	57	99	304	284	194	88	52
29	50	59	61	68	.....	55	99	284	284	178	88	55
30	49	59	88	68	.....	63	94	247	284	163	94	55
31	48	.....	94	68	.....	66	.....	265	.....	152	88	.....
1913–14.												
1	54	70	76	48	68	68	73	92	156	142	83	55
2	54	67	74	48	68	73	73	99	186	163	83	54
3	52	64	70	48	67	73	70	111	211	178	84	53
4	50	63	68	52	68	73	70	123	211	178	84	52
5	50	64	66	111	66	68	78	130	178	163	83	50
6	51	66	65	186	65	68	83	123	149	149	82	50
7	55	66	64	229	62	68	88	123	136	136	81	50
8	55	72	63	229	59	68	88	123	130	136	78	50
9	56	72	61	194	58	68	88	123	123	136	78	51
10	57	78	60	163	57	64	99	123	111	136	76	48
11	83	78	60	142	55	64	111	123	105	130	75	48
12	99	75	59	130	52	68	111	136	105	136	74	48
13	117	71	58	117	51	68	123	149	111	142	75	48
14	111	68	58	105	50	68	130	178	123	142	76	54
15	111	66	58	94	50	78	142	211	142	136	76	65
16	99	67	57	88	50	88	142	211	178	136	74	64
17	88	68	57	83	49	94	149	211	194	130	70	64
18	78	70	55	78	48	111	142	194	211	130	68	69
19	78	70	54	73	48	105	142	186	202	123	64	74
20	78	68	51	68	48	111	149	178	194	130	64	76
21	78	66	51	73	48	111	142	178	178	117	63	77
22	78	68	50	78	49	105	136	186	163	111	63	72
23	78	69	50	78	48	105	123	194	136	99	62	68
24	78	71	49	78	50	105	123	194	136	99	59	68
25	83	72	49	78	52	105	111	194	136	94	59	66
26	83	72	49	78	52	100	111	178	136	88	59	68
27	83	75	49	78	58	94	105	163	130	88	59	68
28	78	78	46	78	63	88	99	149	130	88	59	66
29	73	76	48	73	.....	83	88	136	130	83	59	63
30	68	76	48	73	.....	78	88	123	136	81	59	59
31	68	.....	48	68	.....	78	.....	130	.....	83	57	.....

NOTE.—Discharge determined from a rating curve well defined between 50 and 200 second-feet. Discharge interpolated, for lack of gage reading, May 23, 1912.

Monthly discharge of Lake Creek at outlet of Packwood Lake, near Lewis, Wash., for 1911–1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
1911–12.					
October	53	40	47.1	2,900	B.
November	304	40	109	6,490	A.
December	111	64	81.9	5,040	A.
January	149	57	96.3	5,920	A.
February	163	78	119	6,840	A.
March	75	50	58.7	3,610	B.
April	64	52	59.1	3,520	B.
May	265	63	159	9,780	A.
June	324	163	244	14,500	B.
July	178	105	139	8,550	A.
August	117	73	97.4	5,990	A.
September	130	50	75.4	4,490	B.
The year	324	40	107	77,600	
1912–13.					
October	53	45	50.1	3,080	B.
November	123	48	72.9	4,340	B.
December	94	55	63.0	3,870	B.
January	142	66	86.5	5,320	A.
February	77	52	64.8	3,600	B.
March	66	55	60.2	3,700	B.
April	99	52	69.7	4,150	B.
May	304	78	160	9,840	A.
June	452	202	316	18,800	B.
July	284	152	215	13,200	A.
August	156	80	110	6,760	A.
September	136	52	75.5	4,490	A.
The year	452	45	112	81,200	
1913–14.					
October	117	50	75.0	4,610	A.
November	78	63	70.2	4,180	A.
December	76	46	57.1	3,510	A.
January	229	48	101	6,210	A.
February	68	48	55.7	3,090	A.
March	111	64	83.8	5,150	A.
April	149	70	109	6,490	A.
May	211	92	154	9,470	A.
June	211	105	152	9,040	A.
July	178	81	125	7,690	A.
August	84	57	70.5	4,330	A.
September	77	48	59.9	3,560	A.
The year	229	46	93.0	67,330	

NOTE.—Monthly discharge September to December, 1911, supersedes that published in Water Supply Paper 313, page 33. Mean discharge Sept. 21–30, 1911, was 61.3 second-feet and the run-off 1,220 acre-feet.

LAKE CREEK AT MOUTH, NEAR LEWIS, WASH.

LOCATION.—In sec. 11, T. 13 N., R. 9 E. Willamette meridian, a quarter of a mile above mouth, below Yakima trail bridge, and 2 miles northeast of Lewis, in Lewis County.

DRAINAGE AREA.—26 square miles (approximate); measured on Pl. I, Water Supply Paper 313.

RECORDS AVAILABLE.—August 21, 1907, to January 22, 1913; March 11, 1913, to September 30, 1914.

GAGE.—Vertical staff on right bank, a quarter of a mile below Yakima trail bridge; read to hundredths, by Chas. L. Hall, October 1 to November 28; by E. H. Frank, November 30 to March 31, and by J. L. Jennings, April 3 to September 30.

DISCHARGE MEASUREMENTS.—Made from cable at gage or by wading.

CHANNEL AND CONTROL.—Composed of large boulders; probably permanent; one channel at all stages. Zero flow would occur at gage height −1.0 foot, +0.2, as determined October 4, 1914.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.7 foot at 1.45 p. m. January 7 (discharge, 358 second-feet); minimum stage recorded, 0.45 foot at 12.40 p. m. October 5 (discharge, 56 second-feet). 1907–1914: Maximum stage recorded, 4.0 feet March 15 and 16, 1908 (discharge, 1,440 second-feet); minimum stage recorded, 0.20 foot September 8–19, 1910, and October 30 to November 3, 1911 (discharge, 36 second-feet).

WINTER FLOW.—Discharge relation not seriously affected by ice; open channel rating curve assumed applicable.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Gage-height record considered reliable, but accuracy of results is only fair on account of fragmentary record. Discharge for days on which gage was not read determined by hydrograph comparison with discharge of Lake Creek at outlet of Packwood Lake near Lewis, Washington. Very little diurnal fluctuation.

The following discharge measurement was made by I. L. Collier:
June 15, 1914, gage height 1.10 feet; discharge, 173 second-feet.

Daily discharge, in second-feet, of Lake Creek at mouth, near Lewis, Wash.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	60	83	117	59	104	126	100	141	194	181	97	60
2	60	84	112	59	100	140	99	146	230	190	97	60
3	60	81	106	59	100	129	99	152	274	198	102	60
4	58	78	99	65	99	118	105	158	245	198	102	60
5	56	82	96	290	94	110	112	166	210	185	102	59
6	59	85	94	324	88	102	118	152	192	170	100	59
7	62	84	90	358	83	101	119	152	179	170	98	58
8	61	84	85	324	78	100	120	152	166	170	96	58
9	60	84	82	290	77	100	122	152	153	170	94	58
10	72	85	78	251	76	99	130	152	140	160	92	60
11	85	85	78	212	74	96	138	152	130	150	90	63
12	115	85	78	181	72	94	146	168	130	156	88	66
13	145	84	80	150	72	106	155	184	145	164	89	69
14	140	84	81	136	72	118	179	205	160	164	90	72
15	134	84	76	122	71	128	203	250	176	158	90	75
16	118	85	72	118	70	138	227	250	190	153	86	78
17	102	90	71	114	69	140	220	250	210	148	81	78
18	98	94	70	104	68	143	213	242	245	143	77	83
19	94	90	66	94	67	142	206	235	225	140	72	88
20	96	85	62	94	66	140	198	227	207	152	70	90
21	99	85	62	94	70	140	188	227	195	145	68	92
22	92	85	62	120	75	140	179	235	180	136	66	85
23	85	102	61	145	76	140	170	245	163	124	65	80
24	92	120	60	134	76	140	162	245	148	124	64	80
25	100	107	60	122	78	134	154	245	148	114	63	78
26	92	94	60	120	80	128	147	235	148	106	62	82
27	85	107	59	118	96	122	140	227	144	106	62	82
28	78	120	58	112	112	114	139	196	144	106	61	80
29	72	121	58	106	.....	106	138	180	144	99	61	78
30	77	122	57	107	.....	103	136	160	152	95	61	75
31	82	.....	58	108	.....	100	.....	175	.....	97	60	.....

NOTE.—Discharge determined from a rating curve well defined between 50 and 450 second-feet. Gage read on alternate days Oct. 1 to Mar. 24, beginning Oct. 1, and discharge interpolated for intervening days, except Jan. 4. Gage readings Mar. 25 to Sept. 30 as follows: Mar. 27, 29, 31, Apr. 3, 6, 9, 13, 16, 20, 23, 27, 30; May 4, 9, 13, 20, 27; June 3, 10, 16, 24; July 1, 8, 15, 21, 29; Aug. 5, 12, 19, 26; Sept. 2, 8, 9, 16, 22, and 29. Discharge interpolated for periods between gage heights Mar. 25 to May 3, July 22 to 28, Aug. 27 to Sept. 15. Discharge determined by hydrographic comparison with station at outlet of Packwood Lake Jan. 4 and for periods between gage heights as follows: May 5 to July 20, July 30 to Aug. 4, Aug. 13 to 25, and Sept. 17 to 30.

Monthly discharge of Lake Creek at mouth, near Lewis, Wash., for the year ending Sept. 30, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	145	56	86.7	5,330	B.
November	122	78	92.0	5,470	B.
December	a 117	57	75.7	4,650	B.
January	358	59	151	9,280	B.
February	112	66	80.8	4,490	B.
March	143	94	121	7,440	B.
April	227	99	152	9,040	B.
May	b 250	a 141	195	12,000	C.
June	274	b 130	179	10,700	C.
July	b 198	a 95	147	9,040	C.
August	102	a 60	80.8	4,970	C.
September	b 92	58	72.2	4,300	C.
The year	358	56	120	86,700	

a Interpolated value. b Estimated by comparative hydrograph with upper station.

JOHNSON CREEK BELOW WEST FORK, NEAR LEWIS, WASH.

LOCATION.—In sec. 18, T. 12 N., R. 10 E. Willamette meridian, below West Fork 1 mile above Glacier Creek, 6 miles above mouth, and 7 miles southeast of Lewis in Lewis County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 9, 1911, to December 30, 1912; May 15, 1913, to September 23, 1914, when station was discontinued.

GAGE.—Vertical staff, graduated from 2 to 8 feet, on right bank about 100 feet below West Fork; 2-foot mark on gage is set at same elevation as weir crest; readings to hundredths by Chas. L. Hall, September 9, 1911, to November 30, 1913; by E. H. Frank, December 1, 1913, to March 31, 1914, and by J. L. Jennings, April 1 to September 23, 1914.

DISCHARGE MEASUREMENTS.—Made from footlog at the gage or by wading.

CHANNEL AND CONTROL.—A sharp-lipped rectangular weir 19.80 feet long forms control; weir overflows at gage height 4.7 feet (discharge, 486 second-feet).

EXTREMES OF DISCHARGE.—1911–1914: Maximum stage recorded, 5.1 feet at 12 m. January 6, 1914 (discharge, 666 second-feet); minimum stage recorded, 2.40 feet October 3, 1912, and September 7, 1914 (discharge, 20 second-feet).

WINTER FLOW.—Discharge relation not seriously affected by ice; open channel rating curve assumed applicable.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Gage height record considered reliable, weir required repairs occasionally to prevent leakage and was thought to be leaking June 1 to September 8, 1913; amount of leakage was determined by measurements made above and below weir September 8 and allowance made for leakage in computing estimates June 1 to September 8; considerable diurnal fluctuation March to June; results fair.

The following discharge measurement was made by I. L. Collier:

June 13, 1914, gage height, 1.66 feet; discharge, 183 second-feet.

Daily discharge, in second-feet, of Johnson Creek below West Fork, near Lewis, Wash., for the period Sept. 9, 1911, to Sept. 30, 1914.

Day.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1911-12.													
1		28			28		66			366	206		125
2			22	94		253		57	80			44	
3		32			28		62			411	206		94
4			22	80		206		55	80			36	
5		29			27		48			435	191		55
6			29	80		213		54	94			36	
7		29					50			520	180		55
8			55	94		206		53	143			36	
9	93	29					49			584	109		77
10			55	119		256		94	193			36	
11	35	34					45			560	102		67
12			50	102		230		80	193			35	
13	36	34					40			352	109		53
14			125	83		163		76	282			32	
15	50	37					38			310	108		50
16			94	80		206		94	282			50	
17	45	36					36			256	87		43
18			253	80		230		94	256			55	
19	24	33					36			338	80		40
20			465	75		206		91	296			40	
21	45	32					36			338	77		34
22			195	55		174		80	256			36	
23	36	28			66		36			324	67		33
24			163	55		97		80	243			35	
25	36	27					36			324	62		28
26			218	48		80		77	256			32	
27	32	26					45			310	55		25
28			184	45		75		77	293			32	
29	32	25					45			243	50		24
30			163	40				94	285			50	
31		22			282		45				50		

Day.	Oct.	Nov.	Dec.	May.	June.	July.	Aug.	Sept.
1912-13.								
1	24							
2		36	53		546			31
3	20							
4		36	61					
5	28							
6		44	55		546	266		
7	28						65	
8		80	53					43
9	28							
10			53					
11	28							
12		282	55		474			
13	28							
14		282	61			172		
15	24			218			48	
16		206	61		308			29
17	28			206				
18		125	80					
19	36						47	
20		125	61					
21	32			256				
22		125	55			194		
23	45						44	
24		109						28
25	50						39	
26		80						
27	50							
28		55			380			
29	45			456				
30		53				91		
31	40							

Daily discharge, in second-feet, of Johnson Creek below West Fork, near Lewis. Wash., for the period Sept. 9, 1911, to Sept. 30, 1914—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1913-14.												
1			94			230	80	94		117		24
2	26			43					310			
3		55	80		57	134						
4				67							40	
5			67			109		218				
6				666								
7			67			94	206			80		20
8				269								
9			61			125			109			
10	40			206			243					
11		80	60		46	109					32	
12				143				256				
13			61			153			195			
14				125			282			80		
15			60		48	195						55
16				94								
17			55		48	206	256					
18	80			80					184		28	
19		73	52		50	230		269				
20				69								
21		63	46		62	195	269					
22				125						45		
23		67	45		67	184			230			
24				102			163					40
25		94	43		73	134					24	
26	80			94				184				
27		117	38									
28				80		94	117			40		
29			36									
30				71		94						
31												

NOTE.—Discharge determined from a rating curve well defined below 250 second-feet.

JOHNSON CREEK AT MOUTH, NEAR LEWIS, WASH.

LOCATION.—In sec. 33, T. 13 N., R. 9 E. Willamette meridian, 1 mile above mouth and 3 miles south of Lewis, in Lewis County.

DRAINAGE AREA.—30 square miles (approximate; measured on Plate I, Water-Supply Paper 313).

RECORDS AVAILABLE.—August 21, 1907, to September 23, 1914, when station was discontinued.

GAGE.—Vertical staff attached to large stump on left bank, 1 mile above mouth, read to hundredths, by Chas. L. Hall, October 2 to December 1; by E. H. Frank, December 3 to March 30; by J. L. Jennings, April 2 to September 23.

DISCHARGE MEASUREMENTS.—Made from cable at gage or by wading.

CHANNEL AND CONTROL.—Stream bed at gage and control composed of gravel and boulders which shift during floods; one channel at all stages. Zero flow would occur at gage height −0.7 foot +0.1, as determined September 12, 1913.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.00 feet at 9.40 a. m. January 6 (discharge, 790 second-feet; discharge January 7, was estimated to be 820 second-feet by hydrograph comparison with record of Lake Creek at outlet of Packwood Lake near Lewis); minimum stage recorded, 0.40 foot September 1 and 7 (discharge, 28 second-feet).

1907–1914: Maximum stage recorded, 3.00 feet November 22, 1909 (discharge, 1,830 second-feet); minimum stage recorded, 0.40 foot September 1 and 7, 1914 (discharge, 28 second-feet).

WINTER FLOW.—Discharge relation not seriously affected by ice; open-channel rating curve assumed applicable.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Gage-height record apparently reliable; considerable diurnal fluctuation March to June; results October to March, fair; monthly summaries not computed for remainder of year on account of fragmentary gage-height record.

Discharge measurements of Johnson Creek at mouth, near Lewis, Wash., during the year ending Sept. 30, 1914.

[Made by I. L. Collier.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
June 15	1.29	278
18	1.21	252

Daily discharge, in second-feet, of Johnson Creek at mouth, near Lewis, Wash., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	50	118	189	80	130	367	.....	242	.....	155	.....	28
2	50	116	170	81	112	380	152	.....	410	.....	.....	.....
3	50	105	152	86	111	219	.....	.....	.....	.....	.....	.....
4	50	94	144	145	110	198	.....	.....	.....	.....	51	.....
5	50	95	135	400	100	188	.....	293	.....	.....	.....	.....
6	50	120	135	790	95	160	.....	.....	.....	.....	.....	.....
7	66	118	135	820	91	155	293	.....	.....	91	.....	28
8	68	126	126	547	82	176	.....	.....	.....	.....	.....	.....
9	69	135	118	350	82	196	.....	.....	196	.....	.....	.....
10	70	135	118	293	84	190	349	.....	.....	.....	.....	.....
11	111	135	118	268	86	188	.....	.....	.....	.....	44	.....
12	152	125	118	242	86	190	.....	321	.....	.....	.....	.....
13	192	115	118	215	86	219	.....	.....	.....	.....	.....	.....
14	189	115	118	188	86	256	349	.....	.....	86	.....	.....
15	180	115	118	160	86	293	.....	.....	288	.....	.....	68
16	170	116	108	155	86	300	.....	.....	.....	.....	.....	.....
17	152	135	105	146	86	304	338	.....	.....	.....	38	.....
18	135	140	102	138	88	310	.....	.....	247	.....	.....	.....
19	134	135	97	122	89	304	.....	349	.....	.....	.....	.....
20	170	120	92	120	98	298	.....	.....	.....	.....	.....	.....
21	172	118	92	122	108	293	338	.....	.....	.....	.....	.....
22	152	120	90	233	110	280	.....	.....	.....	68	.....	.....
23	150	135	88	250	111	268	.....	.....	338	.....	.....	68
24	170	186	84	196	116	265	242	.....	.....	.....	.....	.....
25	174	178	81	192	120	219	.....	.....	.....	.....	36	.....
26	135	160	79	188	122	192	.....	262	.....	.....	.....	.....
27	126	210	77	172	188	178	.....	.....	.....	.....	.....	.....
28	118	230	76	155	260	163	.....	.....	.....	60	.....	.....
29	110	232	77	136	.....	156	196	.....	.....	.....	.....	.....
30	113	235	78	138	.....	155	.....	.....	.....	.....	.....	.....
31	116	.....	79	140	.....	154	.....	.....	.....	.....	.....	.....

NOTE.—Discharge determined from a rating curve fairly well defined between 100 and 400 second-feet, but poorly defined above and below these limits.

Monthly discharge of Johnson Creek at mouth, near Lewis, Wash., for the year ending Sept. 30, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	a 192	50	119	7,320	B.
November	a 235	a 94	141	8,390	B.
December	189	76	110	6,760	B.
January	820	b 80	234	14,400	B.
February	a 260	82	107	5,940	B.
March	a 380	b 154	233	14,300	B.
The period				57,100	

a Estimated by comparison with Lake Creek by means of hydrographs. b Interpolated.

HAGAR CREEK NEAR LEWIS, WASH.

LOCATION.—In sec. 26, T. 13 N., R. 9 E. Willamette meridian, half a mile above North Fork of Hagar Creek and 2½ miles southeast of Lewis, in Lewis County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 9, 1911, to December 28, 1912; May 1, 1913, to September 23, 1914, when station was discontinued.

GAGE.—Vertical staff attached to right wing wall of weir; zero of gage set at same elevation as weir crest; read by Charles L. Hall, September 9, 1911, to November 30, 1913; by E. H. Frank December 1, 1913, to March 31, 1914, and by J. L. Jennings April 1 to September 23, 1914.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—A rectangular weir 5.96 feet long, with a crest 1 inch wide on bottom and ends, forms control. Repairs were made occasionally to prevent leakage.

EXTREMES OF DISCHARGE.—1911-1914: Maximum stage recorded, 1.75 feet February 18, 1912 (discharge, 55 second-feet); minimum stage recorded, 0.29 foot September 27 and 29, 1912 (discharge, 4.0 second-feet).

WINTER FLOW.—Discharge relation not seriously affected by ice; open channel rating curve assumed applicable.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Gage-height record apparently reliable, but record is fragmentary; results fair.

The following discharge measurement was made by I. L. Collier:

June 12, 1914, gage height, 0.58 feet; discharge 11.2 second-feet.

Daily discharge, in second-feet, of Hagar Creek near Lewis, Wash., for the period Sept. 9, 1911, to Sept. 30, 1912.

Day.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1911–12.													
1		7.6			11.7		11.1			22.4	13.7		13.4
2			6.7	16.6		23.1		9.8	14.0			8.5	
3		7.4			10.1		11.1			24.2	11.1		11.1
4			6.7	14.6		18.2		9.8	14.0			8.5	
5		7.4			10.1		11.1			17.2	11.1		8.5
6			7.6	16.6		19.6		9.8	15.6			8.3	
7		7.4					10.6			17.2	9.8		7.4
8			13.4	20.6		20.6		11.1	23.5			8.3	
9	18.6	7.4					10.3			16.6	9.0		7.4
10			6.9	22.8		38		16.6	22.8			8.5	
11	8.0	7.8					9.0			16.6	9.0		6.2
12			9.3	18.9		30		15.6	23.5			8.3	
13	6.2	7.6					8.8			17.2	9.0		6.2
14			28.8	17.2		24.2		14.0	28.0			8.0	
15	11.7	8.0					8.5			16.6	8.5		5.2
16			14.0	17.2		53		13.4	24.2			12.6	
17	9.0	7.4					8.5			14.0	9.0		5.2
18			53	15.3		55		13.1	23.8			8.5	
19	8.0	7.4			21.7		8.5			14.0	8.5		4.4
20			53	14.0		28.0		11.1	30			8.3	
21	8.0	7.8			20.6		8.5			14.0	8.5		4.4
22			30	14.0		21.7		11.1	24.2			7.8	
23	8.0	7.4			9.0		8.5			13.1	8.5		4.2
24			20.6	13.7		16.6		11.1	22.4			8.0	
25	8.0	7.4			36		8.5			13.4	8.5		4.2
26			30	12.6		14.0		11.1	22.4			8.5	
27	8.0	7.4			28.8		8.5			12.8	8.5		4.0
28			21.7	12.3		12.6		11.1	24.2			7.4	
29	7.4	6.9			34		8.8			11.1	8.5		4.0
30			18.2	11.7				14.0	18.9			8.5	
31		6.7			32		8.5				8.5		

Daily discharge, in second-feet, of Hagar Creek near Lewis, Wash., for the years ending Sept. 30, 1913–14.

Day.	Oct.	Nov.	Dec.	May.	June.	July.	Aug.	Sept.
1912–13.								
1	5.2			15.6			10.8	8.3
2		8.3	9.8		53	20.6		
3	7.4			15.6			9.8	
4		8.5	14.6		49	18.9		14.0
5	7.4			14.0			9.8	
6		8.5	12.6		40	17.2		8.5
7	7.4			20.6			9.8	
8		20.6	11.7			16.6		
9	7.4			36			9.8	
10		36	12.6		32	16.6		8.5
11	7.4			36			9.8	
12		53	11.7		32	16.6		8.0
13	7.4			32			8.8	
14		32	12.6		28.0	16.6		8.0
15	7.4			28.0			8.8	
16		23.5	12.6		27.2	15.6		7.4
17	8.5			28.0			8.8	
18		17.2	14.6		24.2	14.0		8.3
19	11.1			28.0			8.8	
20		16.9	10.6		28.0	14.0		8.0
21	8.3			30			8.5	
22		11.1	11.1		32	12.6		8.0
23	8.5			40			8.5	
24		13.7	11.1		32	11.4		8.0
25	9.8			44			8.5	
26		12.0	11.1		28.0	11.1		7.6
27	8.5			49			8.5	
28		11.1	11.1		24.2	11.1		8.0
29	8.5			39			8.5	
30		9.3			24.2	10.8		7.5
31	8.5			40			8.3	

Daily discharge, in second-feet, of Hagar Creek near Lewis, Wash., for the years ending Sept. 30, 1913–14—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1913–14.												
1		10.6	15.6					18.9		9.3		6.7
2	7.4			11.1			15.6					
3		9.3	15.0		12.0	22.8			13.4			
4	7.4			21.7							6.9	
5		9.8	13.4			18.2		18.2				
6	8.0			47								
7		14.6	12.6			17.9	21.7			8.0		6.4
8	9.0			37								
9		13.4	12.0		9.8	18.2			12.6			
10	14.3			25.3			33					
11		12.0	12.0			17.2					6.9	
12	12.0			19.9				18.2	10.6			
13		11.7	12.0		11.7	19.2						
14	15.0			16.6			36			9.3		
15		11.7	12.0		11.4	32						6.9
16	14.6			15.0								
17		15.0	12.0		11.4	32	32					
18	13.4			13.4					9.8		6.9	
19		14.6	11.4		11.1	31		16.6				
20	12.0			12.6								
21		12.0	11.1		11.7	29.2	29.2					
22	11.4			21.7						8.0		
23		13.4	10.3		12.6	23.8			20.6			6.9
24	11.7			16.9			21.7					
25		16.6	9.8		11.7	21.0					6.9	
26	11.4			15.6				18.2				
27		18.2	9.8		25.3							
28	9.8			13.4		17.9	18.2			7.4		
29		19.9	9.3									
30	9.3			13.1								
31			9.8			16.6						

NOTE.—Discharge determined from a fairly well defined rating curve.

NORTH FORK OF HAGAR CREEK NEAR LEWIS, WASH.

LOCATION.—In sec. 26, T. 13 N., R. 9 E. Willamette meridian, half a mile above Hagar Creek and 2½ miles southeast of Lewis, in Lewis County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 9, 1911, to December 28, 1912; May 1, 1913, to September 23, 1914, when station was discontinued.

GAGE.—Vertical staff attached to right wing wall, 4 feet upstream from weir; zero of gage is set at same elevation as weir crest; gage read by Charles L. Hall, September 9, 1911; to November 30, 1913; by E. H. Frank December 1, 1913, to March 31, 1914; and by J. L. Jennings April 1 to September 23, 1914.

DISCHARGE MEASUREMENTS.—Made from foot log at weir or by wading.

CHANNEL AND CONTROL.—A rectangular weir, 5.61 feet long with a crest 1 inch wide, forms the control. No leakage.

WINTER FLOW.—Discharge relation not seriously affected by ice; open-channel rating curve assumed applicable.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Gage-height record apparently reliable, but record is fragmentary; results good.

The following discharge measurement was made by I. L. Collier: June 12, 1914, gage height, 0.32 feet; discharge, 3.3 second-feet.

Daily discharge, in second-feet, of North Fork of Hagar Creek near Lewis, Wash., for the period Sept. 9, 1911, to Sept. 30, 1914.

Day.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1911–12.													
1		3.2			4.4		5.9			6.9	4.9		4.8
2			3.0	5.3		9.1		4.9	4.9			3.4	
3		3.2			4.3		5.1			8.0	4.9		3.6
4			3.0	5.1		7.3		4.9	4.9			3.4	
5		3.2			4.3		4.9			5.9	4.8		3.6
6			3.1	4.9		7.3		4.9	4.9			3.2	
7		3.1					4.9			6.5	4.6		4.1
8			4.6	6.7		8.6		4.8	5.5			3.2	
9	5.3	3.1					4.9			6.3	4.8		3.6
10			3.2	6.5		11.7		6.3	5.1			3.6	
11	3.2	3.1					4.8			6.7	4.6		3.2
12			3.2	5.9		11.0		6.5	5.1			3.4	
13	2.5	3.1					4.6			9.1	4.6		3.2
14			8.9	4.9		9.1		5.3	5.3			3.2	
15	4.9	3.2					4.9			6.5	4.3		3.2
16			5.9	4.9		16.8		5.1	5.1			4.9	
17	3.6	3.0					4.6			5.9	3.9		3.2
18			12.2	4.9		16.8		4.9	5.9			3.6	
19	3.2	3.0			9.5		4.6			5.5	3.9		3.2
20			14.0	4.9		11.2		4.9	8.0			3.2	
21	3.2	3.0			8.6		4.6			5.9	3.9		3.2
22	3.2		9.1	4.9		9.1		4.9	6.9			3.0	
23		3.0			7.3		6.3			4.9	3.9		3.2
24			7.1	4.9		6.9		4.9	6.9			3.2	
25	3.2	3.0			11.4		6.3			4.9	3.9		3.2
26			8.9	4.8		6.9		4.6	6.9			3.2	
27	3.2	3.0			11.0		4.6			4.9	3.9		3.2
28	3.2		6.9	4.8		6.5		4.8	6.9			3.2	
29		3.0			11.4		4.6			4.9	3.9		3.2
30			6.7	4.6				4.9	5.9			3.6	
31		3.0			11.4		4.6				3.9		

Day.	Oct.	Nov.	Dec.	May.	June.	July.	Aug.	Sept.
1912–13.								
1	3.2			6.5			4.9	
2		3.2	3.6		12.7	6.9		3.2
3	3.2			5.9			4.9	
4		3.2	4.9		11.4	6.5		4.9
5	3.2			5.9			4.8	
6		3.2	4.8		10.2	4.9		4.1
7	3.2			6.9			4.6	
8		6.7	4.6			6.7		
9	3.2			9.3			4.6	
10		8.2	4.6		9.1	6.7		3.4
11	3.2			10.2			4.6	
12		13.7	4.1		8.0	6.5		3.4
13	3.2			9.1			4.6	
14		8.9	4.1		8.0	6.7		3.4
15	3.2			8.9			4.6	
16		6.9	4.6		6.9	5.9		3.2
17	3.2			6.9			4.6	
18		5.3	4.9		6.9	5.5		3.2
19	4.1			8.6			4.6	
20		4.9	6.9		6.9	5.1		3.2
21	3.2		6.5	8.6			4.3	
22		6.7			6.9	4.9		3.2
23	3.2			9.1			4.3	
24		4.6	6.5		9.1	4.9		3.2
25	3.4			10.2			4.1	
26		4.1	4.6		9.1	4.9		3.2
27	3.2			12.7			4.1	
28		3.6	4.6		8.6	4.9		3.4
29	3.2			11.0			3.4	
30		3.2			7.1	4.9		3.2
31	3.2			10.2			3.4	

Daily discharge, in second-feet, of North Fork of Hagar Creek near Lewis, Wash., for the period Sept. 9, 1911, to Sept. 30, 1914—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1913–14.												
1		3.4	6.5					4.9		3.4		2.5
2	3.2			3.9			5.1		4.8			
3		3.2	5.9		4.9	8.4						
4	3.2			6.5							2.8	
5		3.2	4.9			6.9		4.6				
6	3.2			11.7								
7		4.8	4.9			6.5	6.5			3.2		2.5
8	3.4			9.3								
9		4.6	4.6		4.3	6.5			4.6			
10	4.8			7.3			7.3					
11		3.9	4.6			6.3					3.0	
12	4.1			6.5				4.1	3.6			
13		3.6	4.6		4.4	6.5						
14	4.6			6.1			6.9			3.2		
15		3.6	4.3		4.4	8.4						3.4
16	4.3			5.7								
17		4.8	4.1		4.6	8.3	7.3					
18	4.1			5.3					3.2		2.8	
19		4.6	3.7		4.6	7.5		4.9				
20	4.1			4.9								
21		4.1	4.1		5.1	7.1	6.9					
22	3.4			6.1						3.1		
23		4.1	4.1		5.9	6.9			8.6			3.2
24	3.4			6.5			5.3					
25		4.9	3.6		6.7	6.5					2.5	
26	3.6			6.9				4.9				
27		5.9	3.6		8.6							
28	3.2			6.3		5.3	4.9			3.0		
29		6.7	3.4									
30	3.2			5.3								
31			3.6			4.9						

NOTE.—Discharge determined from a well-defined rating curve.

ROGUE RIVER BASIN.

ROGUE RIVER NEAR TOLO, OREG.

LOCATION.—In sec. 18, T. 36 S., R. 2 W., at Gold Ray, just below the dam and power house of the Rogue Electric Co., 7 miles above Gold Hill, 9 miles below Medford, 1¼ miles below Tolo, and about half a mile below the mouth of Bear Creek.

DRAINAGE AREA.—2,020 square miles.

RECORDS AVAILABLE.—August 30, 1905, to September 30, 1914.

GAGE.—Vertical staff bolted to concrete pier of bridge.

DISCHARGE MEASUREMENTS.—Made from cable 300 feet below gage.

CHANNEL AND CONTROL.—Rock and boulders; practically permanent, one channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.2 feet at 5 p. m. January 22 (discharge, 21,200 second-feet); minimum stage recorded, 0.80 foot August 10 to September 8 (discharge, 1,180 second-feet).

DIVERSIONS.—Most of the low-water flow of Little Butte and Bear creeks diverted for irrigation. See description of stations at Eagle Point and Talent. Practically no other diversions.

REGULATION.—Normal daily flow affected by operation of power plant above station.

ACCURACY.—Results fair; uncertainty due to fluctuation caused by operation of power plant.

The following discharge measurement was made by James E. Stewart:
September 19, gage height, 152 feet; discharge, 1,890 second-feet.

Daily discharge, in second-feet, of Rogue River, near Tolo, Oreg., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,510	1,700	2,440	4,950	4,000	6,750	2,880	2,880	2,730	1,700	1,250	1,180
2	1,420	1,510	2,440	7,750	3,830	6,990	2,730	2,730	2,730	1,700	1,250	1,180
3	1,420	1,600	2,300	7,490	3,350	5,820	2,730	3,030	2,440	1,700	1,250	1,180
4	1,420	1,600	2,040	5,160	3,350	5,600	2,880	3,510	2,440	1,700	1,250	1,180
5	1,420	1,700	2,040	5,160	3,350	6,510	3,350	3,030	2,580	1,700	1,250	1,180
6	1,420	3,670	2,040	4,370	3,030	6,050	3,350	3,030	2,440	1,700	1,250	1,180
7	1,700	3,350	1,810	4,370	3,030	6,510	3,350	2,880	3,030	1,510	1,250	1,180
8	2,880	3,030	1,700	6,510	3,030	6,050	3,350	3,030	3,030	1,510	1,250	1,180
9	3,350	2,170	1,810	4,750	2,730	5,820	3,670	3,030	2,730	1,700	1,250	1,330
10	1,700	1,920	1,920	4,000	2,730	5,600	4,750	3,030	2,730	1,600	1,180	1,330
11	1,700	1,920	1,920	3,350	3,190	5,600	5,160	2,880	2,440	1,700	1,180	1,330
12	1,510	1,920	1,810	3,190	3,350	5,380	4,370	2,880	2,440	1,600	1,180	1,250
13	1,510	1,810	1,700	3,190	3,190	5,160	5,160	2,880	2,440	1,600	1,180	1,250
14	1,700	1,810	1,700	3,670	3,190	5,160	4,950	3,190	2,170	1,510	1,180	1,330
15	1,700	1,810	1,810	4,370	2,730	4,750	6,510	3,670	2,170	1,510	1,180	1,330
16	1,700	1,700	1,810	3,350	2,880	4,750	6,990	3,350	2,170	1,510	1,180	1,510
17	1,700	1,700	1,810	4,000	2,730	4,560	5,600	3,350	2,170	1,510	1,180	2,730
18	1,510	1,920	1,810	4,000	3,030	4,370	4,750	3,190	2,040	1,510	1,180	2,300
19	1,510	1,920	1,810	3,510	3,510	4,370	4,750	3,030	2,040	1,420	1,180	1,920
20	1,510	2,170	1,810	6,050	4,180	4,370	4,750	3,030	1,920	1,510	1,180	1,700
21	1,510	2,170	1,700	6,990	4,370	4,560	4,370	3,030	1,920	1,420	1,180	1,600
22	1,510	2,040	1,810	21,200	4,370	4,560	4,000	3,030	1,810	1,420	1,180	1,510
23	1,420	1,700	1,810	11,300	3,670	4,370	4,000	3,030	1,920	1,330	1,180	1,510
24	1,420	2,170	1,920	10,200	4,000	4,130	4,000	3,510	1,920	1,330	1,180	1,420
25	1,600	2,170	2,170	11,300	5,600	3,830	3,670	4,370	2,040	1,330	1,180	1,420
26	1,600	2,170	2,730	12,500	4,750	3,670	3,510	3,030	1,920	1,330	1,180	1,510
27	1,600	2,170	2,170	8,270	4,750	3,350	3,510	3,030	1,920	1,330	1,180	1,330
28	1,510	2,440	1,920	5,600	5,600	3,190	3,350	2,730	1,920	1,330	1,180	1,330
29	1,510	2,440	1,810	5,160	.....	3,190	3,190	2,730	1,810	1,250	1,180	1,330
30	1,510	2,730	2,170	4,950	.....	3,030	3,030	2,730	1,700	1,250	1,180	1,330
31	1,600	.....	7,490	4,750	.....	3,030	.....	2,730	.....	1,250	1,180	.....

NOTE.—Discharge determined from a rating curve fairly well defined between 1,250 and 6,000 second-feet.

Monthly discharge of Rogue River near Tolo, Oreg., for the year ending Sept. 30, 1914.

[Drainage area, 2,020 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
October	3,350	1,420	1,650	0.817	0.94	101,000	C.
November	3,670	1,510	2,100	1.04	1.16	125,000	B.
December	7,490	1,700	2,140	1.06	1.22	132,000	B.
January	21,200	3,190	6,300	3.12	3.60	387,000	B.
February	5,600	2,730	3,630	1.80	1.87	202,000	B.
March	6,990	3,030	4,880	2.42	2.79	300,000	B.
April	6,990	2,730	4,090	2.02	2.25	243,000	B.
May	4,370	2,730	3,080	1.52	1.75	189,000	B.
June	3,030	1,700	2,260	1.12	1.25	134,000	B.
July	1,700	1,250	1,500	.743	.86	92,200	C.
August	1,250	1,180	1,200	.591	.68	73,800	C.
September	2,730	1,180	1,430	.708	.79	85,100	C.
The year	21,200	1,180	2,850	1.41	19.16	2,060,000	

LITTLE BUTTE CREEK NEAR EAGLE POINT, OREG.

LOCATION.—In the SE. ¼ sec. 35, T. 35 S., R. 1 W., 1½ miles above Eagle Point, at H. B. Tronson's fruit ranch.

DRAINAGE AREA.—336 square miles.

RECORDS AVAILABLE.—July 13, 1907, to September 30, 1914.

GAGE.—Vertical staff spiked to alder trees on left bank.

DISCHARGE MEASUREMENTS.—Made from cable suspension bridge 40 feet above gage or, at extreme low water, by wading.

CHANNEL AND CONTROL.—Sand at measuring station; solid rock control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.50 feet at 8 p. m. January 22 (discharge, 4,560 second-feet); minimum stage recorded, 0.50 foot August 9 to September 6 (discharge, 29 second-feet).

WINTER FLOW.—Discharge relation unaffected by ice.

DIVERSIONS.—A number of small irrigation diversions above the station. The main canal of Rogue River Valley Canal Co. diverts a considerable part of the flow of the stream past the station; also the pipe line, capacity about 7.5 second-feet for municipal supply of city of Medford.

STORAGE.—A small amount developed at Fish Lake, but not being used at present.

ACCURACY.—Results good.

The following discharge measurement was made by James E. Stewart:
September 23, 1914, gage height, 0.96 foot; discharge, 44.9 second-feet.

Daily discharge, in second-feet, of Little Butte Creek near Eagle Point, Oreg., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	73	83	93	1,860	190	190	190	283	190	54	31	29
2	73	83	83	1,120	236	190	190	283	149	54	31	29
3	73	83	73	703	236	190	190	251	136	48	30	29
4	73	83	73	428	220	388	190	251	113	48	30	29
5	73	83	73	300	220	334	190	220	113	48	30	29
6	73	162	73	220	205	351	190	220	251	64	30	31
7	113	136	73	205	220	408	190	220	334	54	30	38
8	93	113	73	190	316	428	251	205	267	42	30	40
9	93	93	73	162	300	428	267	190	205	42	29	40
10	93	93	73	162	267	473	564	190	176	42	29	40
11	83	83	73	162	236	518	496	220	136	38	29	40
12	93	73	73	136	220	518	428	205	113	38	29	40
13	93	73	73	136	190	518	388	176	113	38	29	40
14	93	73	73	388	162	518	370	136	93	36	29	40
15	93	73	73	316	162	518	726	162	93	34	29	40
16	93	73	73	236	162	564	633	162	93	34	29	40
17	93	73	73	162	162	564	541	136	73	34	29	40
18	93	73	73	162	162	564	496	136	73	34	29	83
19	93	73	73	267	162	541	473	136	73	32	29	83
20	93	73	73	850	162	518	450	113	73	32	29	64
21	93	73	73	1,860	162	518	428	113	54	31	29	54
22	83	73	73	2,920	190	473	428	113	54	31	29	54
23	83	73	93	750	190	473	408	136	73	31	29	54
24	83	73	83	541	190	450	388	564	113	31	29	54
25	83	73	83	1,660	236	428	370	473	103	31	29	54
26	83	73	83	1,990	205	334	351	283	93	31	29	54
27	83	73	83	1,420	190	300	351	251	93	31	29	48
28	83	73	93	850	190	251	334	236	83	31	29	48
29	83	93	93	450	.....	220	316	220	73	31	29	48
30	83	113	93	351	.....	220	316	220	64	31	29	48
31	83	.....	2,340	267	.....	190	.....	190	.....	31	29	.....

NOTE.—Discharge determined from a rating curve well defined between 35 and 600 second-feet.

Monthly discharge of Little Butte Creek at Eagle Point, Oreg., for the year ending Sept. 30, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	113	73	86.2	5,300	A.
November	162	73	84.7	5,040	A.
December	2,340	73	151	9,280	A.
January	2,920	136	685	42,100	B.
February	316	162	205	11,400	A.
March	564	190	406	25,000	A.
April	726	190	370	22,000	A.
May	564	113	216	13,300	A.
June	334	64	122	7,260	A.
July	64	31	38.3	2,360	B.
August	31	29	29.3	1,800	B.
September	83	29	45.3	2,700	B.
The year	2,920	29	204	148,000	

ROGUE RIVER VALLEY CANAL NEAR BROWNSBORO, OREG.

LOCATION.—In the SE. ¼ sec. 22, T. 36 S., R. 2 E., 100 feet below intake and about 8 miles above former station at Bradshaw drop.

RECORDS AVAILABLE.—Irrigation seasons of 1913 and 1914.

GAGE.—Vertical staff on left bank just below fish screen.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Earth section affected at times during summer by plant growth; apparently changes slightly.

EXTREMES OF DISCHARGE.—Maximum stage recorded April 1 to September 30, 1.50 feet June 25 (discharge, 33 second-feet); canal dry during winter.

ACCURACY.—Results fair.

Discharge measurements of Rogue River Valley canal near Brownsboro, Oreg., for the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 14	Luper and Cowgill	0.61	13.1	Sept. 23	James E. Stewart	0.44	5.3
July 3	do	1.21	24.5	23	do	.74	12.1

Daily discharge, in second-feet, of Rogue River Valley canal near Brownsboro, Oreg., for the year ending Sept. 30, 1914.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	11	11	12	24	21	21	16			16	22	21	16
2		11	14	23	21	21	17			20	22	21	15
3		11	17	22	22	21	18			24	22	21	15
4		14	18	24	22	22	19			26	22	22	15
5		14	20	27	22	22	20			27	22	22	14
6		14	20	27	22	24	21			27	22	23	14
7		16	21	27	24	27	22			27	22	24	14
8		18	20	26	25	22	23			27	22	26	14
9			18	26	24	16	24			30	22	27	13
10			20	27	22	16	25			33	22	24	12
11			21	28	22	16	26			30	22	22	12
12			21	25	22	16	27			27	21	22	12
13			21	22	22	16	28			26	21	22	11
14	13		18	22	22	16	29			24	21	22	11
15			16	22	22	16	30		15	24	21	21	11
							31		14		21	21	

NOTE.—Discharge determined from two rating curves applicable as follows: Apr. 1 to May 29, fairly well defined; May 30 to Sept. 30, well defined. Discharge estimated for lack of gage readings, May 9–29, 16 second-feet.

Monthly discharge of Rogue River Valley canal near Brownsboro, Oreg., from April to October, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
April			*a* 12	714	D.
May			15.3	941	C.
June	33	12	22.2	1,320	B.
July	28	21	23.2	1,430	B.
August	27	21	22.5	1,380	B.
September	27	11	16.4	976	B.
October			*a* 6.0	369	D.
The period				7.130	

a Estimated.

BEAR CREEK AT TALENT, OREG.

LOCATION.—In sec. 23, T. 38 S., R. 1 W., at highway bridge half a mile northeast of Talent and half a mile below Wagner Creek.

DRAINAGE AREA.—226 square miles.

RECORDS AVAILABLE.—July 11, 1907, to August 26, 1911; April 1 to November 16, 1912, June 6 to October 31, 1913, and May 14 to November 14, 1914, when station was discontinued.

GAGE.—Vertical staff. Datum prior to 1912 was 2.00 feet lower than present datum.

DISCHARGE MEASUREMENTS.—Made from the highway bridge or by wading near the gage.

CHANNEL.—Sand and gravel; shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded May 14 to November 14, 1914, 1.65 feet May 25 (discharge, 25 second-feet); minimum stage indeterminate as gage readings were not accurate during low water.

DIVERSIONS.—Most of the low-water flow diverted for irrigation above the station.

ACCURACY.—Results fair.

Discharge measurements of Bear Creek at Talent, Oreg., for the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 14	Luper and Cowgill	1.27	130
Sept. 10	James E. Stewart	.54	7.0

Daily discharge, in second-feet, of Bear Creek at Talent, Oreg., for the period May 14 to Nov. 14, 1914.

Day.	May.	June.	July.	Sept.	Oct.	Nov.	Day.	May.	June	July.	Sept.	Oct.	Nov.
1	.....	139	45	.....	30	19	16	139	87	6	.....	19	.....
2	.....	139	19	.....	30	19	17	139	65	6	.....	65	.....
3	.....	126	19	.....	30	19	18	139	65	6	.....	65	.....
4	.....	139	19	.....	30	19	19	139	45	6	.....	112	.....
5	.....	139	19	.....	30	19	20	139	45	6	11	87	.....
6	.....	139	19	.....	30	19	21	139	45	6	11	30	.....
7	.....	168	19	.....	19	19	22	168	45	6	11	19	.....
8	.....	139	19	.....	19	19	23	168	45	4	11	19	.....
9	.....	139	30	.....	19	19	24	168	87	4	19	19	.....
10	.....	139	45	7	19	19	25	250	65	4	30	19	.....
11	.....	112	30	.....	19	19	26	184	45	4	30	19	.....
12	.....	112	30	.....	19	19	27	168	45	4	30	15	.....
13	.....	112	19	.....	11	11	28	154	45	4	30	11	.....
14	131	87	19	.....	11	11	29	139	45	4	30	11	.....
15	154	87	11	.....	11	.....	30	139	45	4	30	19	.....
							31	139	.....	4	.....	19	.....

NOTE.—Discharge determined from a fairly well defined rating curve. Discharge estimated for lack of gage readings, Sept. 1–9, 4 second-feet and Sept. 11–19, 5 second-feet.

Monthly discharge of Bear Creek at Talent, Oreg., for the period May 14 to Nov. 14, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
May 14–31	250	131	155	5,530	B.
June	168	45	91.2	5,430	B.
July	45	4	14.2	873	C.
August	----------	----------	a 2.0	123	D.
September	30	----------	11.0	655	D.
October	112	11	28.2	1,730	B.
November 1–14	19	11	17.9	497	B.
The period	----------	----------	----------	14,800	

a Estimated.

APPLEGATE RIVER NEAR BUNCOM, OREG.

LOCATION.—In the SW. ¼ sec. 15, T. 39 S, R. 3 W., 2½ miles above the confluence of Applegate and Little Applegate Rivers, about 3 miles west of Buncom and 12 miles southwest from Jacksonville.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 18, 1911, to September 30, 1914, when station was discontinued.

GAGE.—Vertical staff fastened to the downstream side of the bridge pier.

DISCHARGE MEASUREMENTS.—Made by wading or from wagon bridge.

CHANNEL AND CONTROL.—Gravel and washed boulders; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.1 feet, December 31 and January 22 (discharge, 2,750 second-feet); minimum stage recorded, 1.25 feet September 2 and 3 (discharge, 37 second-feet); minimum discharge, including Cameron ditch, 45 second-feet.

DIVERSIONS.—Cameron's ditch diverts around the gage. Records of discharge in ditch added to give total discharge past this point. A few other diversions farther upstream.

ACCURACY.—Results fair.

Discharge measurements of Applegate River near Buncom, Oreg., for the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
May 30.1914	Luper and Chinnock.	3.00	718	Sept. 22,1914	James E. Stewart.	1.54	82.0
				Mar. 14,1915	.....do.....	3.07	708

Daily discharge, in second-feet, of Applegate River near Buncom, Oreg., for the years ending Sept. 30, 1913–14.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1912–13.												
1	47	88	153	373	356	276	606	502	830	306	145	48
2	47	88	149	306	373	276	606	455	830	276	145	48
3	47	95	149	306	373	276	502	455	830	262	133	56
4	52	95	160	291	373	306	502	502	715	306	129	111
5	52	95	145	248	338	322	772	606	660	276	125	95
6	59	1,490	139	221	338	338	606	830	606	248	119	84
7	47	502	133	276	338	373	553	1,020	553	234	113	74
8	52	338	129	373	338	412	528	1,020	553	221	106	74
9	52	1,300	129	276	338	502	502	1,160	502	195	102	68
10	47	890	129	262	338	553	553	950	434	190	95	64
11	47	434	129	248	373	553	660	890	412	171	84	61
12	47	502	139	248	392	502	830	830	412	160	80	56
13	44	553	183	455	412	455	715	772	373	153	74	51
14	44	715	322	455	412	412	660	660	373	149	84	51
15	44	553	478	412	455	373	606	660	338	145	80	51
16	44	412	412	338	528	338	553	772	306	139	80	48
17	44	338	434	306	606	373	553	772	306	133	74	46
18	44	306	434	1,160	553	412	606	830	306	133	68	46
19	44	306	373	660	502	373	606	772	373	129	68	46
20	47	306	322	478	478	373	660	772	306	125	68	42
21	47	276	306	392	434	338	715	715	276	119	68	42
22	56	234	248	373	373	356	715	890	338	149	68	38
23	180	221	248	306	373	306	660	1,020	322	195	64	38
24	99	195	234	306	338	306	660	1,020	291	392	61	38
25	119	190	221	338	338	276	830	950	291	373	61	38
26	205	176	195	338	322	276	950	890	338	276	56	42
27	99	176	195	338	306	276	830	890	455	221	51	42
28	81	171	190	338	276	276	660	890	434	195	51	42
29	112	167	190	338	.....	338	606	660	356	183	56	48
30	124	167	553	338	.....	553	553	715	338	171	51	48
31	99	.....	373	338	.....	660	.....	772	.....	153	51	.....
1913–14.												
1	48	48	201	1,490	772	1,140	615	665	772	230	70	40
2	48	61	178	2,400	772	1,080	615	772	772	212	70	37
3	48	56	162	1,490	665	950	717	888	772	212	70	37
4	48	56	147	1,350	665	888	950	888	665	212	65	40
5	48	61	132	1,350	615	888	1,140	828	640	186	65	40
6	48	828	132	1,140	590	1,010	1,010	828	540	186	65	40
7	48	565	127	1,490	565	1,010	1,010	888	515	179	60	40
8	74	188	119	1,140	515	1,080	950	888	515	179	60	53
9	84	127	119	950	515	1,140	1,010	888	466	173	60	49
10	64	106	111	772	515	1,210	1,490	828	466	164	56	45
11	64	102	162	665	515	1,210	1,140	828	515	154	56	42
12	61	106	162	665	615	1,210	1,010	828	490	148	53	42
13	61	95	228	665	615	1,210	1,080	888	466	142	53	40
14	61	84	194	772	615	1,140	1,280	950	442	142	53	40
15	51	80	178	772	590	1,080	1,980	1,010	442	134	49	40
16	56	80	162	665	590	1,080	1,350	950	442	126	53	42
17	61	80	162	665	615	1,080	1,140	950	442	120	49	418
18	61	138	147	665	717	1,080	1,080	888	442	115	49	134
19	61	95	132	615	828	1,140	1,210	888	394	108	45	179
20	56	102	132	665	828	1,140	1,280	888	370	100	45	115
21	56	102	127	2,190	950	1,210	1,080	950	326	100	45	100
22	51	95	132	2,750	888	1,210	950	1,010	326	95	45	84
23	51	106	147	1,910	828	1,140	888	1,010	326	91	42	74
24	51	132	147	1,560	772	1,010	828	888	442	91	42	74
25	51	132	211	1,490	888	950	772	888	326	91	40	70
26	48	228	178	2,260	828	888	772	772	306	91	40	70
27	48	665	162	1,560	772	772	717	717	248	84	40	70
28	48	282	147	1,210	888	717	665	665	248	78	40	70
29	48	380	132	950	.....	772	640	665	248	74	40	65
30	48	264	178	888	.....	665	640	717	230	74	40	65
31	48	.....	2,750	828	.....	615	.....	772	.....	74	40	.....

NOTE.—Discharge determined from four rating curves applicable as follows: Sept. 30 to Nov. 6, 1912, fairly well defined; Nov. 7, 1912, to Aug. 7, 1913, a transition curve fairly well defined; Aug. 8 to Dec. 31, 1913, fairly well defined; Jan. 1 to Sept. 30, 1914, fairly well defined.

Monthly discharge of Applegate River near Buncom, Oreg., for the years ending Sept. 30, 1913–14.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
1912–13.					
October	205	44	70.1	4,310	B.
November	1,490	88	379	22,600	C.
December	553	129	245	15,100	C.
January	1,160	221	369	22,700	C.
February	606	276	392	21,800	C.
March	660	276	379	23,300	C.
April	950	502	645	38,400	C.
May	1,160	455	795	48,900	C.
June	830	276	449	26,700	B.
July	392	119	206	12,700	B.
August	145	51	84.2	5,180	B.
September	111	38	54.5	3,240	B.
The year	1,490	38	338	245,000	
1913–14.					
October	84	48	54.8	3,370	B.
November	828	48	181	10,800	B.
December	2,750	111	239	14,700	B.
January	2,750	615	1,230	75,600	C.
February	950	515	698	38,800	B.
March	1,210	615	1,020	62,700	B.
April	1,980	615	1,000	59,500	B.
May	1,010	665	854	52,500	B.
June	772	230	453	27,000	B.
July	230	74	134	8,240	B.
August	70	40	51.6	3,170	B.
September	418	37	75.2	4,470	B.
The year	2,750	37	498	361,000	

Combined monthly discharge of Applegate River and Cameron ditch near Buncom, Oreg., for the years ending Sept. 30, 1913–14.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
1912–13.					
October	208	46	72.7	4,470	B.
November	1,490	90	380	22,600	C.
December	555	129	246	15,100	C.
January	1,170	222	370	22,800	C.
February	607	277	392	21,800	C.
March	665	277	382	23,500	C.
April	950	505	648	38,600	C.
May	1,170	457	801	49,300	C.
June	838	279	454	27,000	B.
July	401	127	211	13,000	B.
August	154	59	92.0	5,660	B.
September	121	46	62.0	3,690	B.
The year	1,490	46	342	248,000	
1913–14.					
October	88	51	58.7	3,610	B.
November	831	51	183	10,900	B.
December	2,750	112	241	14,800	B.
January	2,750	618	1,230	75,600	C.
February	952	515	699	38,800	B.
March	1,210	615	1,020	62,700	B.
April	1,990	615	1,010	60,100	B.
May	1,020	667	861	52,900	B.
June	781	238	460	27,400	B.
July	238	78	142	8,730	B.
August	79	45	59.7	3,670	B.
September	426	46	80.0	4,760	B.
The year	2,750	45	502	364,000	

CAMERON DITCH NEAR BUNCOM, OREG.

LOCATION.—In the SW. ¼ sec. 15, T. 39 S., R. 3 W., about 3 miles west of Buncom, and 12 miles southwest of Jacksonville. This ditch diverts around the gage on Applegate River near Buncom, and monthly discharge of the ditch should be added to that of the creek to give total flow.

RECORDS AVAILABLE.—June 18, 1911, to September 30, 1914, when station was discontinued.

GAGE.—Vertical staff.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Gravel.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.5 feet April 25–28, May 8, 14, 20, June 26 and 29, July 2, 3, 7, 9, 23, and 24, August 8, 16, 17, 25, and 29 (discharge, 10 second-feet); ditch dry at various times during year.

ACCURACY.—Results approximate, and valuable only in the determination of total flow of Applegate River.

The following discharge measurement was made by James E. Stewart:
September 22, 1914, gage height, 0.31 foot; discharge, 0.57 second-foot.

Daily discharge, in second-feet, of Cameron ditch near Buncom, Oreg., for the years ending Sept. 30, 1913–14.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1912-13.												
1	2.3	2.3	0.4	1.8	0.0	0.6	3.4	0.0	6.7	0.6	8.8	7.7
2	2.8	2.0	.4	1.3	.0	.6	3.4	2.1	7.7	.6	7.7	7.7
3	2.8	1.6	.4	1.3	.0	.6	3.4	2.1	7.7	5.8	8.8	8.8
4	2.6	1.6	.4	1.3	.0	.6	3.4	2.1	7.7	5.8	8.8	10.0
5	2.8	1.6	.4	1.3	.0	1.0	4.1	2.1	7.7	5.8	5.8	7.7
6	.0	4.2	.4	.6	.0	1.0	4.1	2.1	7.7	4.9	5.8	6.7
7	2.3	4.2	.4	.6	.0	1.5	4.1	7.7	7.7	4.1	6.7	8.8
8	2.0	1.8	.4	1.3	.0	.6	4.1	7.7	7.7	3.4	7.7	4.1
9	2.0	1.8	.4	1.3	.0	.6	4.1	8.8	7.7	3.4	7.7	4.9
10	2.3	.9	.4	1.3	.0	4.1	4.1	8.8	6.7	2.7	7.7	4.1
11	2.3	.9	.4	1.3	.0	4.1	4.1	8.8	6.7	.0	3.4	4.1
12	2.3	.9	.4	1.3	.6	4.1	4.1	8.8	3.4	4.1	2.7	3.4
13	2.3	.9	.4	2.3	.6	4.1	4.1	8.8	3.4	6.7	7.7	5.8
14	2.3	.9	.4	.4	.6	4.1	4.1	8.8	3.4	6.7	8.8	5.8
15	2.0	.9	2.3	.0	.6	4.1	4.1	8.8	3.4	6.7	8.8	5.8
16	2.0	.6	2.3	.0	.6	4.1	4.1	6.7	3.4	5.8	8.8	8.8
17	2.0	.6	2.3	.0	.6	4.1	4.1	6.7	3.4	6.7	8.8	8.8
18	2.0	.6	2.3	5.8	.6	4.1	4.1	6.7	3.4	4.9	8.8	8.8
19	2.0	.6	1.8	1.5	.6	4.1	4.1	7.2	3.4	6.7	8.8	8.8
20	2.0	.4	1.8	.6	.6	4.1	4.1	7.2	3.4	6.7	8.8	8.8
21	2.0	.4	1.8	.6	.6	4.1	.0	6.2	3.4	7.7	8.8	8.8
22	2.3	.4	1.8	.6	.6	4.1	.0	5.8	2.7	4.9	8.8	8.8
23	3.5	.4	1.8	.6	.6	4.1	.0	6.7	2.7	4.9	8.8	7.7
24	3.5	.2	1.8	.6	.6	4.1	.0	3.4	2.7	8.8	7.7	8.8
25	3.5	.2	1.8	.6	.3	4.1	.0	5.8	4.1	8.8	7.7	10.0
26	3.5	.1	1.3	.6	.3	4.1	.0	5.8	4.9	6.7	6.7	8.8
27	4.2	.1	1.3	.6	.3	3.4	.0	5.8	4.9	7.7	7.7	8.8
28	3.5	.1	1.3	.6	.6	3.4	.0	5.8	3.4	7.7	8.8	7.7
29	3.6	.1	1.3	.6	.....	3.4	.0	4.9	.6	6.7	8.8	7.7
30	3.5	.1	2.3	.0	.....	4.9	.0	5.8	.6	6.7	8.8	7.7
31	3.5	.....	1.8	.0	.....	4.9	.....	5.8	.....	5.8	8.8	.....

Daily discharge, in second-feet, of Cameron ditch near Buncom, Oreg., for the years ending Sept. 30, 1913–14—Continued.

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1913–14.												
1	7.7	2.7	3.4	4.1	0.0	1.0	0.0	2.1	8.8	7.7	8.8	8.8
2	7.7	2.7	3.4	4.1	.0	1.0	.0	2.1	8.8	10.0	8.8	8.8
3	4.9	2.7	2.7	3.4	.0	1.0	.0	2.1	8.8	10.0	8.8	8.8
4	4.1	2.7	2.1	3.4	.0	1.0	.0	7.7	2.1	8.8	8.8	8.8
5	4.1	2.7	2.1	3.4	.0	1.0	8.8	7.7	5.8	7.7	8.8	8.8
6	4.1	2.7	1.5	3.4	.0	1.0	7.7	7.7	5.8	6.7	8.8	8.8
7	4.1	2.7	1.5	3.4	.0	1.0	7.7	7.7	5.8	10.0	6.7	8.8
8	4.1	2.7	1.5	3.4	.0	1.5	8.8	10.0	4.9	8.8	10.0	2.1
9	4.1	1.5	1.5	2.7	1.5	1.5	7.7	7.7	4.1	10.0	8.8	7.7
10	3.4	1.5	1.5	2.7	1.5	1.5	7.7	7.7	4.1	8.8	1.5	7.7
11	3.4	1.5	1.5	2.7	1.5	1.5	7.7	7.7	6.7	8.8	7.7	7.7
12	3.4	1.5	1.5	2.7	1.5	1.5	6.7	7.7	6.7	4.9	7.7	7.7
13	3.4	1.5	1.5	2.7	1.5	1.5	6.7	8.8	6.7	4.9	8.8	7.7
14	3.4	1.0	1.5	2.7	1.5	1.5	7.7	10.0	6.7	4.9	8.8	7.7
15	3.4	1.0	1.5	2.7	1.5	1.5	7.7	6.7	6.7	8.8	8.8	7.7
16	3.4	1.0	1.5	2.7	1.5	1.5	7.7	6.7	6.7	8.8	10.0	7.7
17	3.4	1.0	1.5	2.7	2.1	1.5	.0	3.4	6.7	8.8	10.0	7.7
18	3.4	3.4	1.5	2.7	2.1	1.5	.0	3.4	6.7	4.9	8.8	4.9
19	3.4	1.5	1.5	2.7	2.1	1.5	6.7	7.7	5.8	4.9	8.8	3.4
20	3.4	2.7	1.5	4.1	2.1	1.5	3.4	10.0	5.8	8.8	8.8	1.5
21	3.4	1.5	1.0	3.4	2.1	1.5	3.4	7.7	4.9	8.8	7.7	1.0
22	3.4	.6	1.0	4.9	2.1	1.5	3.4	7.7	4.9	8.8	4.9	.0
23	3.4	.6	1.5	.0	2.1	1.5	7.7	7.7	6.7	10.0	7.7	.0
24	3.4	.6	1.5	.0	2.1	1.5	8.8	7.7	7.7	10.0	7.7	.0
25	3.4	1.5	1.5	.0	1.0	1.5	10.0	7.7	7.7	6.7	10.0	.0
26	3.4	2.7	1.5	.0	1.0	1.5	10.0	7.7	10.0	6.7	8.8	.0
27	3.4	3.4	1.0	.0	1.0	.0	10.0	8.8	6.7	8.8	4.9	.0
28	3.4	3.4	1.0	.0	1.0	.0	10.0	8.8	8.8	.0	4.9	.0
29	3.4	4.1	1.0	.0	.....	.0	2.1	7.7	10.0	8.8	10.0	.0
30	3.4	4.1	1.5	.0	.....	.0	2.1	7.7	7.7	8.8	8.8	.0
31	3.4	.....	4.9	.0	.....	.0	.....	2.1	.....	8.8	8.8	.....

NOTE.—Discharge determined from two approximate rating curves.

Monthly discharge of Cameron ditch near Buncom, Oreg., for the years ending Sept. 30, 1913–14.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
1912–13.				
October	4.2	0.0	2.57	158
November	4.2	.1	1.05	62
December	2.3	.4	1.18	73
January	5.8	.0	.99	61
February	.6	.0	.33	18
March	4.9	.6	3.12	192
April	4.1	.0	2.64	157
May	8.8	.0	5.93	365
June	7.7	.6	4.74	282
July	8.8	.0	5.44	334
August	8.8	2.7	7.82	481
September	10.0	3.4	7.47	444
The year	10.0	.0	3.63	2,630
1913–14.				
October	7.7	3.4	3.86	237
November	4.1	.6	2.11	126
December	4.9	1.0	1.73	106
January	4.9	.0	2.28	140
February	2.1	.0	1.17	65
March	1.5	.0	1.15	71
April	10.0	.0	5.67	337
May	10.0	2.1	6.96	428
June	10.0	2.1	6.64	395
July	10.0	.0	7.85	483
August	10.0	1.5	8.14	501
September	8.8	.0	4.79	285
The year	10.0	.0	4.38	3,170

UMPQUA RIVER BASIN.

NORTH UMPQUA RIVER NEAR HOAGLIN, OREG.

LOCATION.—In sec. 18, T. 26 S., R. 1 W., one-fourth mile above the forest boundary, 10 miles above Hoaglin and about 9 miles below Steamboat Creek.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—February 20 to May 31, 1911; April 30 to September 21, 1912; August 20 to September 8, 1914.

GAGE.—Vertical staff.

DISCHARGE MEASUREMENTS.—Made from cable above gage.

CHANNEL AND CONTROL.—Rocky and deep; practically permanent.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, 950 second-feet September 8; minimum discharge recorded, 800 second-feet September 6.

ACCURACY.—Results good.

COOPERATION.—Gage height record furnished by United States Forest Service, S. C. Bartrum, supervisor.

No discharge measurements were made during the year.

Daily discharge, in second-feet, of North Umpqua River near Hoaglin, Oreg., from Aug. 20 to Sept. 8, 1914.

Day.	Aug.	Sept.	Day.	Aug.	Sept.	Day.	Aug.	Sept.
1		835	11			21	870	
2		835	12			22	870	
3		826	13			23	870	
4		817	14			24	870	
5		808	15			25	862	
6		800	16			26	853	
7		875	17			27	844	
8		950	18			28	835	
9			19			29	835	
10			20		870	30	835	
						31	835	

NORTH UMPQUA RIVER NEAR OAKCREEK, OREG.

LOCATION.—In sec. 23, T. 26 S., R. 5 W., just below ferry 3 miles west of Oakcreek, about 5 miles east of the former station at Winchester, and about 8 miles northeast of Roseburg.

DRAINAGE AREA.—1,000 square miles.

RECORDS AVAILABLE.—September 6, 1905, to October 10, 1908; July 24, 1913, to September 30, 1914.

GAGE.—Staff; lower section inclined, upper section vertical.

DISCHARGE MEASUREMENTS.—Made from ferry cable.

CHANNEL AND CONTROL.—Gravel and rock; somewhat shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.55 feet at 4 p. m. December 31 (discharge, 17,000 second-feet); minimum stage recorded, 1.45 feet at 4 p. m. September 5 (discharge, 830 second-feet).

ACCURACY.—Results good.

Discharge measurements of North Umpqua River near Oakcreek, Oreg., for the year ending Sept. 30, 1914.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Nov. 8	R. R. Randell	4.35	4,180
Sept. 8	James E. Stewart	2.26	1,490

Daily discharge, in second-feet, of North Umpqua River near Oakcreek, Oreg., for period Aug. 1, 1913, to Sept. 30, 1914.

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,560	1,120	1,080	1,140	4,740	9,260	5,410	9,090	2,470	2,620	2,190	1,460	1,000	860
2	1,560	1,140	1,040	1,130	3,910	11,200	4,840	8,180	2,470	2,620	2,110	1,440	1,000	860
3	1,400	1,160	1,020	1,120	3,360	9,500	4,180	7,380	2,890	2,590	2,020	1,420	1,000	860
4	1,240	1,560	1,000	1,120	2,960	7,800	3,820	8,300	2,920	2,560	1,930	1,380	1,000	848
5	1,460	1,420	1.040	1,200	2,860	6,100	3,650	10,500	3,010	2,490	2,040	1,360	986	830
6	1,440	1,280	1,080	9,020	2,470	5,310	3,740	8,490	3,100	2,490	4,460	1,330	965	1,280
7	1,420	1,230	7,160	6,300	2,360	6,100	3,650	7,600	2,920	2,430	4,280	1,280	965	1,720
8	1,420	1,180	5,020	4,510	2,250	7,200	3,420	7,100	3,460	2,560	4,090	1,260	944	1,490
9	1,400	1,180	1,700	3,780	2,130	5,900	3,180	6,610	3,410	2,490	2,080	1,330	944	1,240
10	1,380	1,160	1,680	3,060	2,110	4,930	2,890	6,000	5,310	2,440	2,820	1,280	944	944
11	1,350	1,160	1,440	2,780	2,080	4,360	5,120	5,500	5,350	2,390	2,620	1,260	944	930
12	1,350	1,140	1,450	2,430	2,020	3,790	5,400	5,270	4,880	2,370	2,820	1,250	930	916
13	1,330	1,120	1,460	2,390	2,000	3,520	5,220	4,930	4,400	2,390	2,680	1,240	930	1,000
14	1,330	1,100	1,960	2,370	1,840	3,820	4,640	4,460	9,020	2,890	2,360	1,220	930	1,080
15	1,350	1,100	2,000	2,190	1,680	4,550	4,410	4,230	9,140	2,750	2,040	1,200	930	1,350
16	1,330	1,080	1,960	2,460	1,680	4,460	4,180	4,000	6,300	2,490	2,020	1,180	930	1,800
17	1,300	1,100	1,720	2,720	1,600	4,460	4,090	3,910	5,800	2,400	2 040	1,160	930	3,030
18	1,280	1,080	1,530	3,260	1,620	3,570	4,360	3,820	5,220	2,310	2,000	1,160	930	2,190
19	1,260	1,080	1,500	3,030	1,650	4,270	4,460	3,740	4,790	2,270	2,800	1,150	930	2,230
20	1,260	1,080	1,460	2,890	1,620	6,940	4,270	3,650	4,360	2,250	1,780	1,140	916	1,900
21	1,240	1,070	1,380	2,860	1,720	15,800	4,360	3,570	3,860	2,370	1,720	1,140	916	1,580
22	1,220	1,060	1,260	3,030	1,820	15,300	4,640	3,460	3,490	3,410	1,650	1,120	916	1,330
23	1,220	1,040	1,240	3,340	1,820	12,400	4,930	3,330	3,460	3,030	1,700	1,100	906	1,200
24	1,220	1,020	1,200	3,650	1,750	12,600	11,000	3,300	3,180	3,100	2,370	1,080	895	1,120
25	1,220	1,020	1,180	4,090	4,550	12,900	10,800	2,860	3,060	3,180	1,860	1,080	895	1,080
26	1,200	1,020	1,170	4,890	4,740	13,200	8,060	2,750	2,980	2,780	1,720	1,080	895	1,080
27	1,180	1,000	1,160	5,460	3,570	9,500	10,200	2,620	2,890	2,560	1,680	1,080	895	1,080
28	1,180	1,000	1,120	5,120	3,160	6,940	10,000	2,560	2,750	2,370	1,620	1,060	874	1,080
29	1,120	1,000	1,100	8,300	2,750	5,700	.....	2,520	2,620	2,250	1,560	1,040	874	1,040
30	1,100	1,120	1,120	6,520	2,750	6,500	.....	2,490	2,590	2,250	1,510	1,040	874	1,000
31	1,110	.....	1,120	.....	17,000	6,000	.....	2,560	.....	2,220	.....	1,020	874	.....

NOTE.—Discharge determined from a rating curve well defined from 1,000 to 5,000 second-feet and fairly well defined above. Discharge interpolated for lack of gage readings, Jan. 3 and all Sundays.

Monthly discharge of North Umpqua River near Oakcreek, Oreg., from August, 1913, to September, 1914.

[Drainage area, 1,000 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
1913.							
August	1,560	1,100	1,300	1.30	1.50	79,900	A.
September	1,560	1,000	1,130	1.13	1.26	67,200	A.
1913–14.							
October	7,160	1,000	1,660	1.66	1.91	102,000	A.
November	9,020	1,120	3,540	3.54	3.95	211,000	A.
December	17,000	1,600	2,990	2.99	3.45	184,000	A.
January	15,800	3,520	7,540	7.54	8.69	464,000	B.
February	11,000	2,890	5,320	5.32	5.54	295,000	A.
March	10,500	2,490	4,990	4.99	5.75	307,000	A.
April	9,140	2,470	4,070	4.07	4.54	242,000	A.
May	3,410	2,220	2,560	2.56	2.95	157,000	A.
June	4,460	1,510	2,250	2.25	2.51	134,000	A.
July	1,460	1,020	1,200	1.20	1.38	73,800	A.
August	1,000	874	931	.931	1.07	57,200	B.
September	3,030	830	1,300	1.30	1.45	77,400	A.
The year	17,000	830	3,180	3.18	43.19	2,300,000	

NORTH UMPQUA RIVER AT WINCHESTER, OREG.

LOCATION.—In the NE. ¼ sec. 25, T. 26 S., R. 6 W., at Southern Pacific Railroad bridge in Winchester, 300 yards below power plant and 400 yards below the highway bridge; about 5 miles north of Roseburg.

DRAINAGE AREA.—1,080 square miles.

RECORDS AVAILABLE.—November 10, 1908, to December 31, 1913, when station was discontinued; September 6, 1905, to October 10, 1908, at Oakcreek station, about 5 miles above present station.

GAGE.—Vertical staff, in three sections, bolted to left face of left railroad bridge pier, lower section reading 0 to 3.1, middle 3.0 to 18.0, and upper 18.0 to 23.0 feet.

DISCHARGE MEASUREMENTS.—Made from railroad bridge at low and medium stages; in higher water from highway bridge.

CHANNEL AND CONTROL.—Rock and gravel; practically permanent; one channel at high and low stages, two at medium.

EXTREMES OF DISCHARGE.—Maximum stage recorded October 1 to December 31, 7.4 feet; November 6 (discharge, 11,600 second-feet); minimum stage recorded, 1.80 feet October 2–6 and 29–31 (discharge, 1,090 second-feet). Not the extremes for year.

ACCURACY.—Results fair.

Discharge measurements of North Umpqua River at Winchester, Oreg., for the year ending Sept. 30, 1914.

[Made by R. R. Randell.]

Date.	Gage height.	Discharge.
Nov. 7	5.40	6,990
Nov. 10	3.46	3,120

Daily discharge, in second-feet, of North Umpqua River at Winchester, Oreg., from Oct. 1 to Dec. 31, 1913.

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1	1,140	1,180	5,100	11	1,680	2,970	2,070	21	1,330	3,120	1,680
2	1,090	1,280	4,130	12	1,480	2,540	2,070	22	1,280	2,820	1,680
3	1,090	1,180	3,440	13	1,430	2,400	2,010	23	1,280	5,300	1,890
4	1,090	1,180	3,120	14	2,010	2,010	1,890	24	1,180	5,920	1,680
5	1,090	1,380	2,820	15	2,010	1,890	1,890	25	1,180	4,310	2,540
6	1,090	11,600	2,540	16	1,890	1,780	1,780	26	1,140	4,700	5,300
7	3,700	7,700	2,540	17	1,890	1,780	1,780	27	1,180	5,100	3,780
8	4,700	4,700	2,400	18	1,630	2,010	1,780	28	1,140	5,100	3,280
9	2,540	3,120	2,260	19	1,530	1,780	1,680	29	1,090	6,130	2,970
10	1,890	3,040	2,130	20	1,380	2,680	1,680	30	1,090	7,230	2,680
								31	1,090	.....	6,780

NOTE.—Discharge determined from a fairly well defined curve.

Monthly discharge of North Umpqua River at Winchester, Oreg., for period October to December, 1913.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
1913.				
October	4,700	1,090	1,590	97,800
November	11,600	1,180	3,600	214,000
December	6,780	1,680	2,690	165,000
The period				477,000

UMPQUA RIVER NEAR ELKTON, OREG.

LOCATION.—In sec. 8, T. 23 S., R. 7 W., at the falls in the river, 4 miles south by road from Elkton, and 8 miles by river above Elk Creek.

DRAINAGE AREA.—3,680 square miles.

RECORDS AVAILABLE.—October 18, 1905, to December 31, 1906, and May 12, 1907, to September 30, 1914.

GAGE.—Staff in five sections. Low-water section inclined, the others vertical. Datum lowered 0.52 foot September 2, 1910.

DISCHARGE MEASUREMENTS.—Made from ferry 100 feet below gage.

CHANNEL AND CONTROL.—Gravel; somewhat shifting.

EXTREMES OF STAGE.—Maximum stage recorded during year, 13.0 feet at 7 a. m. January 1; minimum stage recorded, 0.20 foot August 21 to September 8.

Estimates withheld for additional data.

The following measurement was made by James E. Stewart:

September 26, 1914: Gage height, 0.66 foot; discharge, 1,690 second-feet.

Daily gage height, in feet, of Umpqua River near Elkton, Oreg., for the year ending Sept. 30, 1914.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.6	0.4	6.9	12.0	7.6	10.2	4.0	2.8	2.0	1.2	0.4	0.2
2	.5	.6	6.4	9.0	7.4	9.0	3.8	2.6	1.8	1.1	.4	.2
3	.4	.6	5.6	11.4	7.2	8.0	3.6	2.4	1.6	1.4	.4	.2
4	.4	1.0	5.2	9.6	7.0	7.6	3.6	2.7	1.6	1.2	.4	.2
5	.4	1.7	4.8	9.0	6.8	8.5	4.0	2.8	1.8	1.0	.3	.2
6	.4	3.0	4.5	8.6	6.5	8.8	3.9	2.6	2.0	1.0	.3	.2
7	.5	7.2	4.2	8.0	6.1	7.8	3.6	2.9	2.6	.8	.3	.2
8	2.8	6.0	4.0	7.6	5.7	7.2	3.4	3.1	3.9	.8	.3	.2
9	3.4	4.4	3.8	7.0	5.3	6.8	3.6	2.8	4.0	.8	.3	.5
10	3.0	4.0	3.6	6.2	4.4	6.4	4.3	2.6	3.3	.9	.3	.6
11	2.6	3.6	3.4	5.8	4.3	6.0	5.5	2.4	3.0	.8	.3	.4
12	2.2	3.1	3.0	5.6	5.4	5.8	5.0	2.4	2.8	.6	.3	.4
13	1.8	2.7	2.5	5.7	5.2	5.6	4.8	2.6	2.6	.6	.3	.3
14	1.4	2.2	2.1	6.1	5.0	5.0	4.6	2.9	2.4	.8	.3	.3
15	1.2	1.8	1.8	6.5	4.8	4.6	4.7	2.8	2.2	.8	.3	.3
16	1.0	1.6	1.8	6.9	4.7	4.4	7.7	2.6	2.0	.6	.3	.5
17	1.5	1.5	1.7	7.3	4.4	4.2	7.2	2.4	1.8	.6	.3	.9
18	1.8	1.8	1.8	7.8	4.0	4.0	6.0	2.4	1.6	.5	.3	1.7
19	1.8	2.1	1.8	8.5	3.8	3.8	5.4	2.2	1.6	.4	.3	1.3
20	1.6	2.4	1.7	9.6	3.6	3.7	5.0	2.4	1.4	.4	.3	1.0
21	1.4	2.6	1.8	11.0	3.4	3.6	4.6	3.2	1.2	.6	.2	.8
22	1.1	3.4	2.0	15.0	3.2	3.4	4.2	3.6	1.3	.4	.2	1.0
23	.8	3.2	2.3	15.2	3.4	3.6	4.8	3.0	1.7	.4	.2	1.1
24	.6	3.0	2.7	13.4	3.8	3.4	4.6	2.8	2.0	.6	.2	.8
25	.4	3.0	3.1	15.8	4.8	3.2	4.4	3.0	2.0	.6	.2	.8
26	.3	3.6	5.0	17.8	5.6	3.0	4.2	3.7	1.8	.5	.2	.7
27	.3	4.2	4.8	17.0	7.2	3.1	3.7	3.6	1.6	.5	.2	.6
28	.3	5.1	4.2	13.0	8.5	3.0	3.4	3.2	1.4	.4	.2	.6
29	.3	5.6	3.7	9.8	.....	3.2	3.2	2.8	1.2	.4	.2	.5
30	.3	6.6	3.4	8.0	.....	3.5	3.0	2.4	1.2	.4	.2	.4
31	.3	.....	3.2	7.8	.....	3.8	.....	2.2	.....	.4	.2	.....

WILSON RIVER BASIN.

NORTH FORK OF WILSON RIVER NEAR TILLAMOOK, OREG.

LOCATION.—In the NW. ¼ sec. 24, T. 1 S., R. 9 W., 800 feet above mouth of North Fork, about 8 miles from Tillamook, and about 11 miles from Bay City.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 21, 1913, to September 30, 1914.

GAGE.—Vertical staff on left bank.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Gravel and cobblestones; likely to shift.

EXTREMES OF STAGE.—Maximum stage recorded during year, 5.10 feet, January 23; minimum stage recorded, 1.32 feet, September 2 and 3.

DIVERSIONS.—No diversions above the station.

Discharge measurements of North Fork of Wilson River near Tillamook, Oreg., for the year ending Sept. 30, 1914.

[Made by C. L. Batchelder.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Sept. 2	1.32	15.1
8	1.49	30.8

Daily discharge, in second-feet, of North Fork of Wilson River near Tillamook, Oreg., for the period Sept. 1, 1913, to Sept. 30, 1914.

Day.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	18	46	62	515	190	830	425	260	82	46	46	22	18
2	29	43	62	450	242	729	358	242	82	46	46	22	16
3	380	40	72	475	315	685	380	315	82	46	46	22	16
4	1,640	40	94	435	425	740	335	315	62	46	46	22	18
5	550	40	146	315	402	740	335	295	62	46	46	22	18
6	358	40	225	295	550	602	295	260	62	46	46	22	40
7	278	175	190	225	830	575	295	225	62	62	40	22	62
8	190	175	160	146	1,490	575	260	190	72	82	40	22	40
9	146	160	160	132	1,340	575	225	190	82	72	40	22	28
10	132	380	160	106	1,100	550	225	242	72	72	40	22	22
11	119	315	160	106	800	525	190	260	62	46	33	22	22
12	106	208	160	82	800	475	160	225	54	46	33	22	22
13	106	358	160	62	860	425	160	218	54	46	33	22	22
14	82	344	132	82	800	402	208	358	46	46	33	22	40
15	74	450	132	106	685	335	225	335	46	46	33	22	94
16	72	358	160	160	586	335	208	278	46	46	33	22	106
17	62	278	190	146	525	335	190	278	46	46	33	22	132
18	62	208	197	208	475	295	160	225	46	46	33	22	208
19	62	166	208	260	575	278	132	190	46	40	28	18	260
20	54	160	225	190	770	208	106	160	46	40	28	18	242
21	54	132	225	160	1,160	160	106	160	46	46	28	18	208
22	54	106	260	132	1,610	190	106	160	40	54	28	18	119
23	54	106	295	132	1,760	218	132	132	40	94	28	18	82
24	49	106	450	132	1,550	225	175	132	46	132	28	18	106
25	46	94	550	175	1,460	260	242	106	62	106	28	18	119
26	46	82	550	175	1,460	260	260	106	106	82	22	18	94
27	46	78	658	160	1,370	295	315	132	106	72	22	18	82
28	54	66	890	190	1,490	380	335	106	82	62	22	18	78
29	54	62	1,040	190	1,520	.....	380	94	62	62	22	18	72
30	54	54	980	208	1,190	.....	315	82	46	62	22	18	62
31	.....	72	.....	190	1,010	.....	278	.....	46	.....	22	18	.....

NOTE.—Discharge determined from two well-defined rating curves, one applicable Aug. 21 to Sept. 3, 1913, and the other Sept. 4, 1913, to Sept. 30, 1914. Discharge Aug. 21–30, 1913, 20 second-feet; Aug. 31, 18 second-feet.

Monthly discharge of North Fork of Wilson River near Tillamook, Oreg., for the years ending Sept. 30, 1913–14.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
1913.					
August 21–31	20	18	19.8	432	A.
September	1,640	18	168	10,000	B.
The period	1,640	18	128	10,400	
1913–14.					
October	450	40	160	9,840	
November	1,040	62	298	17,700	B.
December	515	62	205	12,600	B.
January	1,760	190	946	58,200	B.
February	830	160	436	24,200	C.
March	425	106	242	14,900	B.
April	358	82	209	12,400	B.
May	106	40	61.1	3,760	B.
June	132	40	59.5	3,540	A.
July	46	22	33.2	2,040	A
August	22	18	20.3	1,250	A.
September	260	16	81.6	4,860	B.
The year	1,760	16	228	165,000	

NEHALEM RIVER BASIN.

NEHALEM RIVER AT SALMONBERRY, NEAR BALM, OREG.

LOCATION.—In sec. 10, T. 3 N., R. 8 W., about 500 feet above Salmonberry Creek, 500 feet above railroad bridge and 13 miles northeast of Balm.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 1, 1913, to January 7, 1914.

GAGE.—Vertical staff on left bank.

DISCHARGE MEASUREMENTS.—Made from railroad bridge.

CHANNEL.—Rock; practically permanent.

EXTREMES OF STAGE.—Maximum stage recorded during year, 21.6 feet January 7; minimum stage recorded, 0.50 feet August 31.

COOPERATION.—Gage-height record furnished by city of Astoria.

The following discharge measurement was made by C. L. Batchelder:

August 31, 1914, discharge, 105 second-feet; gage height could not be referred to gage datum.

Daily gage height, in feet, of Nehalem River at Salmonberry, near Balm, Oreg., from Oct. 1, 1913, to Jan. 7, 1914.

[H. L. Pies, observer.]

Day.	Oct.	Nov.	Dec.	Jan.	Day.	Oct.	Nov.	Dec.	Jan.
1	1.55	2.35	10.8	7.5	16	4.9	4.30	4.50	.....
2	1.50	2.40	9.2	8.0	17	4.6	7.0	4.80	.....
3	1.50	2.40	7.8	9.8	18	4.3	7.2	5.0	.....
4	1.40	2.90	7.1	12.2	19	4.2	7.6	5.1	.....
5	1.38	3.60	6.2	15.6	20	3.95	7.0	4.95	.....
6	1.95	6.2	5.8	18.2	21	3.4	6.6	4.90	.....
7	2.90	6.6	5.5	21.6	22	3.25	7.6	4.70	.....
8	2.65	6.0	5.2	.....	23	3.15	10.7	4.65	.....
9	2.60	5.4	4.80	.....	24	2.9	11.4	4.45	.....
10	3.00	5.0	4.65	.....	25	2.78	10.2	4.70	.....
11	3.75	4.85	4.50	.....	26	2.65	9.4	4.60	.....
12	3.40	4.40	4.40	.....	27	2.6	9.2	4.65	.....
13	5.2	4.10	4.25	.....	28	2.4	10.1	4.85	.....
14	5.1	3.80	4.35	.....	29	2.22	12.2	5.0	.....
15	5.0	3.80	4.30	.....	30	2.02	12.4	5.4	.....
					31	2.3	.....	7.6	.....

NOTE.—Gage washed out Jan. 7 just after observer made his reading; temporary gages read Jan. 8 to Aug. 31, 1914, were not referred to original datum and readings after Jan. 7 are therefore not published.

MISCELLANEOUS MEASUREMENTS.

Miscellaneous measurements in Columbia River basin during the year ending Sept. 30, 1914.

Walla Walla River basin.

Date.	Stream.	Tributary to or diverting from—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Aug. 27 [d]	Mill Creek	Walla Walla River	Above city waterworks, near Walla Walla, Wash.	(a) (b)	58
29 [d]	do	do	do	(a)	62
29 [d]	Touchet River	do	3 miles below Dayton, Wash	(b)	33.1
29 [d]	Petit Creek	Touchet River	Dayton, Wash	(c)	

John Day River basin.

Jan. 11	Canyon Creek	John Day River	Dam site 10 miles above Canyon City, Oreg.	0.32	11.4
15	do	do	Canyon City, Oreg	.01	21.4

Deschutes River basin.

Oct. 27	Deschutes River	Columbia River	Former gaging station at ranger station near Lapine, Oreg.	1.86	1,140
Apr. 1	do	do	do	1.24	1,000
Aug. 16	do	do	do	1.39	1,020
20	do	do	Below North canal dam, near Bend, Oreg., in SE. ¼, sec. 23, T. 17 S., R. 12 E.		503
July 15	do	do	Above Little Falls, in SW. ¼ sec. 16, T. 16 S., R. 12 E., Oreg.	− .67	612
17	do	do	do	− .70	602
Aug. 21	do	do	do	− .78	486
July 15	do	do	White Rock ranch, NW. ¼ sec. 10, T. 16 S., R. 12 E., Oreg.		615
16	do	do	Former Cline Falls gaging station, sec. 14, T. 15 S., R. 12 E Oreg.	.44	604
16	do	do	Tetherow Bridge, SE. ¼ sec. 36, T. 14 S., R. 12 E., Oreg.		606
Apr. 3	Davis Creek	Deschutes River	Graft's ranch, at mouth, Oreg		241
May 30	do	do	do		226
June 1	Fall River	do	Above falls, in SE. ¼ sec. 33, T. 20 S., R. 10 E., Oreg.		121
Dec. 13	East Fork	do	Former gaging station, Lapine, Oreg.	1.30	152
Apr. 3	do	do	do	2.30	295
5	do	do	do	2.58	336
Aug. 13	do	do	do	.93	92.6
8	Crescent Creek	East Fork	Former gaging station below Cold Creek, near Crescent, Oreg.	1.01	53.9
8	Cold Creek	Crescent Creek	Mouth, Oregon		13.8
9	Big Marsh Creek	do	One mile below Big Marsh, Oreg.		
9	Beaver Creek	Big Marsh Creek	Mouth, Oregon		1.6
May 29	Mayfield Ditch	East Fork	About 1½ miles above Morsen intake station, Oregon.		19.7
Oct. 29	Spring River	Deschutes River	Mouth, in NW. ¼ sec. 6, T. 20 S., R. 11 E., Oregon.		167
Apr. 2	do	do	do		224
June 1	do	do	do		204
Aug. 15	do	do	do		195
15	Inflow from springs.	do	Between Spring River and West's bridge, Oregon.		13.5
14	do	do	Between West's bridge and Benham Falls, Oreg.		28.4
July 13	Tumalo Creek	do	Mouth, near Laidlaw, Oreg		2.0
June 8	Hoffman ditch	Crooked River	Opposite gaging station near Prineville, Oreg.		1.3
8	Canal	do	Opposite gaging station at bridge, at Prineville, Oreg.		31.2
7	Ochoco and Rye Grass canal.	Ochoco Creek	Prineville, Oreg., opposite Ochoco Creek station.		10.1
May 21	Power flume	Shitike Creek	Warmspring, Oreg		18.7
June 9	Mill Creek	Warm Springs River	Indian Office sawmill, Oregon	1.30	71.6
July 1	do	do	do	1.10	49.2

[a] City waterworks diversion estimated to be 25 second-feet.
[b] Some irrigation diversions above point of measurement.
[c] Estimated.
[d] Measurement made in 1913 but left out of that report through error.

Miscellaneous measurements in Columbia River basin during the year ending Sept. 30, 1914—Continued.

Klickitat River basin.

Date.	Stream.	Tributary to or diverting from—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
July 19	Klickitat River	Columbia River	NW. ¼ sec. 12, T. 4 N., R. 13 E., Wash.	1.37	1,170
27	do	do	do	1.20	1,010

White Salmon River basin.

July 3	Intermittent springs.	White Salmon River	Near Trout Lake, Wash		32.6
Sept. 16	do	do	do		0

Hood River basin.

Sept. 25	East Fork	Hood River	Above Mount Hood canal, near Parkdale, Oreg.		167
25	do	do	Above Trout Creek, SW. ¼ sec. 18, T. 1 N., R. 10 E., Oreg.		201
25	Hood River	Columbia River	Above dam at Dee, Oreg		311
8	do	do	Wmans, Oreg., discontinued gaging station.	−0.08	368
25	Small tributary	East Fork	Mouth, SE. ¼ sec. 5, T. 1 S., R. 10 E., Oreg.		7.0
25	do	do	Mouth, NE. ¼ sec. 20, T. 1 N., R. 10 E., Oreg.		4.0
25	do	do	Mouth, SW. ¼ sec. 17, T. 1 N., R. 10 E., Oreg.		7.0
Mar. 18	Trout Creek	do	Near Parkdale, Oreg., SW. ¼ sec. 32, T. 1 N., R. 10 E., Oreg.		6.15
Sept. 25	do	do	Mouth, SE. ¼ sec. 18, T. 1 N., R. 10 E., Oreg.		5.69
10	Middle Fork	Hood River	2 miles west of Parkdale, Oreg		59.0
25	do	do	One-half mile above mouth, in SW. ¼ sec. 18, T. 1 N., R. 10 E., Oreg.		113
Mar. 18	3 springs	Middle Fork	1½ miles west of Parkdale, Oreg		13.3
Sept. 25	East Fork irrigation district canal.	East Fork	Above spillway, Oreg		31.6
25	do	do	Below spillway, Oreg		16.5
Mar. 17	Mount Hood canal	do	Near intake, sec. 5, T. 1 S., R. 10 E., Oreg.		8.3
Sept. 25	do	do	do		7.4

Sandy River basin.

Aug. 27	Sandy River	Columbia River	1½ miles above Muddy Fork, Oreg.		55.2
26	do	do	Above Zigzag River, Oreg	2.25	134
27	Muddy Fork	Sandy River	1½ miles above mouth, Oreg		42.8
27	Clear Creek	do	1 mile above mouth, Oreg		6.0
26	Zigzag River	do	Mouth, Oreg	4.87	112
26	Still Creek	Zigzag River	Road crossing, near Rowe, Oreg.	.82	27.9

[a] Estimated.

Miscellaneous measurements in Columbia River basin during the year ending Sept. 30, 1914—Continued.

Willamette River basin.

Date.	Stream.	Tributary to or diverting from—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Oct. 3	North Santiam River.	Santiam River	Above Marion Fork, Oreg.	0.52	123
27	do	do	do	.72	143
24	Marion Fork	North Santiam River	Marion Lake, former gaging station.	.88	95.7
3	do	do	Mouth, Oreg.	.56	180
27	do	do	do	.59	189
6	South Fork	Puzzle Creek	Former gaging station, near Hoover, Oreg.	1.22	36.9
15	do	do	do	1.27	37.3
19	do	do	do	1.23	34.1
26	do	do	do	1.17	25.5
6	North Fork	do	do	.98	12.1
19	do	do	do	1.08	18.9
25	do	do	do	.99	8.4
26	do	do	do	.98	10.1
4	Minto Creek	North Santiam River	Mouth, SW. ¼ sec. 10, T. 11 S., R. 7 E., Oreg.	2.38	13.1
21	Permelia Creek	do	Below springs, ½ mile below outlet of Permelia Lake, Oreg.		18.7
11	Whitewater Creek	do	3½ miles above mouth, Oreg.		75.2
10	Tunnel Creek	do	300 feet above mouth, Oreg.		4.14
8	Boulder Creek	do	Mouth, Oreg.		29.5
17	do	do	do		42.1
June 24	South Santiam River.	Santiam River	Former gaging station at Waterloo, Oreg.	1.78	1,620
21	Salem power canal.	North Santiam River	Intake, near Stayton, Oreg.		169
Sept. 7	Clackamas River	Willamette River	Above Hot Springs, Oreg.	.40	352

Lewis River basin.

July 25	South Fork	Lewis River	One-half mile above Heison Bridge, Oreg.		101

Rogue River basin.

Sept. 11	Rogue River	Pacific Ocean	Former gaging station near Prospect, Oreg.	1.00	408
13	Mill Creek	Rogue River	do	2.71	45.3
12	Red Blanket Creek	do	Near Prospect, Oreg.		69.2
12	Middle Fork	do	do		124
12	South Fork	do	do		88.8

Umpqua River basin.

Sept. 7	South Umpqua River.	Umpqua River	Roseburg, Oreg.		108

Yaquina River basin.

Aug. 18	Yaquina River	Pacific Ocean	Near Chitwood, Oreg.	0.65	7.4

Trask River basin.

Sept. 1	Trask River	Pacific Ocean	Near Tillamook, Oreg.		89.4

Wilson River basin.

Sept. 2	Wilson River	Pacific Ocean	Above North Fork, near Tillamook, Oreg.		76.1

Nehalem River basin.

Aug. 31	Salmonberry Creek	Nehalem River	Mouth, at Salmonberry station, Oreg.		32.9

INDEX.

STREAM-GAGING STATIONS

AND

PUBLICATIONS RELATING TO WATER RESOURCES

PART XII.—NORTH PACIFIC SLOPE BASINS

STREAM-GAGING WATER STATIONS AND PUBLICATIONS RELATING TO WATER RESOURCES.

INTRODUCTION.

Investigation of water resources by the United States Geological Survey has consisted in large part of measurements of the volume of flow of streams and studies of the conditions affecting that flow, but it has comprised also investigation of such closely allied subjects as irrigation, water storage, water powers, underground waters, and quality of waters. Most of the results of these investigations have been published in the series of water-supply papers, but some have appeared in the bulletins, monographs, professional papers, and annual reports.

The results of stream-flow measurements are now published annually in 12 parts, each part covering an area whose boundaries coincide with natural drainage features as indicated below:

Part I. North Atlantic slope basins.
II. South Atlantic slope and eastern Gulf of Mexico basins.
III. Ohio River basin.
IV. St. Lawrence River basin.
V. Upper Mississippi River and Hudson Bay basins.
VI. Missouri River basin.
VII. Lower Mississippi River basin.
VIII. Western Gulf of Mexico basins.
IX. Colorado River basin.
X. Great Basin.
XI. Pacific slope basins in California.
XII. North Pacific slope basins.

HOW GOVERNMENT REPORTS MAY BE OBTAINED OR CONSULTED.

Water-supply papers and other publications of the United States Geological Survey containing data in regard to the water resources of the United States may be obtained or consulted as indicated below.

1. Copies may be obtained free of charge by applying to the Director of the Geological Survey, Washington, D. C. The edition printed for free distribution is, however, small and is soon exhausted.

2. Copies may be purchased at nominal cost from the Superintendent of Documents, Government Printing Office, Washington, D. C., who will on application furnish lists giving prices.

3. Sets of the reports may be consulted in the libraries of the principal cities in the United States.

4. Complete sets are available for consultation in the local offices of the water-resources branch of the Geological Survey, as follows:

Boston, Mass., 2500 Customhouse.
Albany, N. Y., Room 19, Federal Building.
Atlanta, Ga., Post Office Building.
Madison, Wis., care of Railroad Commission of Wisconsin.
St. Paul, Minn, Old Capitol Building.
Helena, Mont., Montana National Bank Building.
Denver, Colo., 403 New Post Office Building.
Salt Lake City, Utah, 421 Federal Building.
Boise, Idaho, 615 Idaho Building.
Portland, Oreg., 416 Couch Building.
Tacoma, Wash., 406 Federal Building.
San Francisco, Cal., 328 Customhouse.
Los Angeles, Cal., 619 Federal Building.
Phoenix, Ariz., 417 Fleming Building.
Austin, Tex., Old Post Office Building.
Honolulu, Hawaii, Kapiolani Building.

A list of the Geological Survey's publications may be obtained by applying to the Director of the United States Geological Survey, Washington, D. C.

STREAM-FLOW REPORTS.

Stream-flow records have been obtained at more than 3,400 points in the United States, and the data obtained have been published in the reports tabulated below:

Stream-flow data in reports of the United States Geological Survey.

[A=Annual Report; B=Bulletin; WS=Water-Supply Paper.]

Report.	Character of data.	Year.
10th A, pt. 2	Descriptive information only	
11th A, pt. 2	Monthly discharge and descriptiv information	1884 to September, 1890.
12th A, pt. 2	....do	1884 to June 30, 1891.
13th A, pt. 3	Mean discharge in second-feet	1884 to Dec. 31, 1892.
14th A, pt. 2	Monthly discharge (long-time records, 1871 to 1893)	1888 to Dec. 31, 1893.
B 131	Descriptions, measurements, gage heights, and ratings	1893 and 1894.
16th A, pt. 2	Descriptive information only	
B 140	Descriptions, measurements, gage heights, ratings, and monthly discharge (also many data covering earlier years).	1895.
WS 11	Gage heights (also gage heights for earlier years)	1896.
18th A, pt. 4	Descriptions, measurements, ratings and monthly discharge (also similar data for some earlier years).	1895 and 1896.
WS 15	Descriptions, measurements, and gage heights, eastern United States, eastern Mississippi River, and Missouri River above junction with Kansas.	1897.
WS 16	Descriptions, measurements, and gage heights, western Mississippi River below junction of Missouri and Platte, and western United States.	1897.
19th A, pt. 2	Descriptions, measurements, ratings, and monthly discharge (also some long-time records).	1897.
WS 27	Measurements, ratings, and gage heights, eastern United States, eastern Mississippi River, and Missouri River.	1898.
WS 28	Measurements, ratings, and gage heights, Arkansas River and western United States.	1898.

Stream-flow data in reports of the United States Geological Survey—Continued.

Report.	Character of data.	Year.
20th A, pt. 4	Monthly discharge (also for many earlier years)	1898.
WS 35 to 39	Descriptions, measurements, gage heights, and ratings	1899.
21st A, pt. 4	Monthly discharge	1899.
WS 47 to 52	Descriptions, measurements, gage heights, and ratings	1900.
22d A, pt. 4	Monthly discharge	1900.
WS 65, 66	Descriptions, measurements, gage heights, and ratings	1901.
WS 75	Monthly discharge	1901.
WS 82 to 85	Complete data	1902.
WS 97 to 100	....do	1903.
WS 124 to 135	....do	1904.
WS 165 to 178	....do	1905.
WS 201 to 214	....do	1906.
WS 241 to 252	....do	1907–8.
WS 261 to 272	....do	1909.
WS 281 to 292	....do	1910.
WS 301 to 312	....do	1911.
WS 321 to 322	....do	1912.
WS 351 to 362	....do	1913.
WS 381 to 394	....do	1914.

The records at most of the stations discussed in these reports extend over a series of years, and miscellaneous measurements at many points other than regular gaging stations have been made each year. An index of the reports containing records obtained prior to 1904 has been published in Water-Supply Paper 119.

The following table gives, by years and drainage basins, the numbers of the papers on surface-water supply published from 1899 to 1914. The data for any particular station will, as a rule, be found in the reports covering the years during which the station was maintained. For example, data for Machias River at Whitneyville, Me., 1903 to 1914, are published in Water-Supply Papers 97, 124, 165, 201, 241, 261, 281, 301, 321, 351, and 381, which contain records for the New England streams from 1903 to 1914. Results of miscellaneous measurements are published by drainage basins.

Numbers of water-supply papers containing results of stream measurements, 1899–1914.

Year.	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII		
												North Pacific slope basins.		
	North Atlantic slope (St. John River to York River).	South Atlantic slope and eastern Gulf of Mexico (James River to the Mississippi).	Ohio River.	St. Lawrence River and Great Lakes.	Hudson Bay and upper Mississippi River.	Missouri River.	Lower Mississippi River.	Western Gulf of Mexico.	Colorado River.	Great Basin.	Pacific slope in California.	Pacific slope in Washington and upper Columbia River.	Snake River basin.	Lower Columbia River and Pacific slope in Oregon.
1899[a]	35	[b] 35, 36	36	36	36	[c] 36, 37	37	37	[d] 37, 38	38, [e] 39	38, [f] 39	38	38	38
1900[g]	47, [h] 48	48	48, [i] 49	49	49	49, [j] 50	50	50	50	51	51	51	51	51
1901	65, 75	65, 75	65, 75	65, 75	[k] 65, 66, 75	66, 75	[k] 65, 66, 75	66, 75	66, 75	66, 75	66, 75	66, 75	66, 78	66, 75
1902	82	[b] 82, 83	83	[l] 82, 83	[k] 83, 85	84	[k] 83, 84	84	85	85	85	85	55	85
1903	97	[b] 97, 98	98	97	[k]98, 99, [m]100	99	[k] 98, 99	99	100	100	100	100	100	100
1904	[n] 124, [o] 125, [p] 126	[p] 126, 127	128	129	[k] 128, 130	130, [q] 131	[k] 128, 131	132	133	133, [r] 134	134	135	135	135
1905	[n] 165, [o] 166, [p] 167	[p] 167, 168	169	170	171	172	[k] 169, 173	174	175, [t] 177	176, [r] 177	177	178	178	[s] 177, 178
1906	[n] 201, [o] 202, [p] 203	[p] 203, 204	205	206	207	208	[k] 205, 209	210	211	212, [r] 213	213	214	214	214
1907–8	241	242	243	244	245	246	247	248	249	250, [r] 251	251	252	252	252
1909	261	262	263	264	265	266	267	268	269	270, [r] 271	271	272	272	272
1910	281	282	283	284	285	286	287	288	289	290	291	292	292	292
1911	301	302	303	304	305	306	307	308	309	310	311	312	312	312
1912	321	322	323	324	325	326	327	328	329	330	331	332–A	332–B	332–C
1913	351	352	353	354	355	356	357	358	359	360	361	362–A	362–B	362–C
1914	381	382	383	384	385	386	387	388	389	390	391	392	393	394

a Rating tables and index to Water-Supply Papers 35–39 contained in Water-Supply Paper 39. Estimates for 1899 in Twenty-first Annual Report, Part IV.
b James River only.
c Gallatin River.
d Green and Gunnison rivers and Grand River above junction with Gunnison.
e Mohave River only.
f Kings and Kern rivers and south Pacific coast drainage basins.
g Rating tables and index to Water-Supply Papers 47–52 and data on precipitation, wells, and irrigation in California and Utah contained in Water-Supply Paper 52. Estimates for 1900 in Twenty-second Annual Report, Part IV.
h Wissahickon and Schuylkill rivers to James River.
i Scioto River.
j Loup and Platte rivers near Columbus, Nebr., and all tributaries below junction with Platte.
k Tributaries of Mississippi from east.
l Lake Ontario and tributaries to St. Lawrence River proper.
m Hudson Bay only.
n New England rivers only.
o Hudson River to Delaware River, inclusive.
p Susquehanna River to Yadkin River, inclusive.
q Platte and Kansas rivers.
r Great Basin in California, except Truckee and Carson river basins.
s Below junction with Gila.
t Rogue, Umpqua, and Siletz rivers only.

In these papers and in the following lists the stations are arranged in downstream order. The main stem of any river is determined by measuring or estimating its drainage area—that is, the headwater stream having the largest drainage area is considered the continuation of the main stream, and local changes in name and lake surface are disregarded. All stations from the source to the mouth of the main stem of the river are presented first, and the tributaries in regular order from source to mouth follow, the streams in each tributary basin being listed before those of the next basin below.

The exceptions to this rule occur in the records for Mississippi River, which are given in four parts, as indicated on page III, and in the records for large lakes, where it is simpler to take up the streams in regular order around the rim of the lake than to cross back and forth over the lake surface.

PART XII. NORTH PACIFIC SLOPE DRAINAGE BASINS.

PRINCIPAL STREAMS.

The largest rivers discharging into the Pacific Ocean in Oregon and Washington are Rogue, Umpqua, and Columbia rivers and streams that reach the ocean through Puget Sound. The principal tributaries of the Columbia are Kootenai, Clark Fork, Spokane, Wenatchee, Yakima, Snake, Walla Walla, Umatilla, John Day, Deschutes, Klickitat, Willamette, and Lewis rivers. Nisqually, Puyallup, White, Snohomish, and Skagit rivers flow into Puget Sound. The streams of this division drain wholly or in part the States of Idaho, Montana, Nevada, Oregon, Utah, Washington, and Wyoming.

In addition to the list of gaging stations and the annotated list of publications relating specifically to the section, these pages contain a similar list of reports that are of general interest in many sections and cover a wide range of hydrologic subjects, and also brief references to reports published by State and other organizations (see pp. XXXI–XXXII).

GAGING STATIONS.

NOTE.—Dash after a date indicates that station was being maintained September 30, 1914. Period after a date indicates discontinuance.

BETWEEN COLUMBIA RIVER AND PUGET SOUND.

Chehalis River at Centralia, Wash., 1910–11.
Quinault River at Quinault, Wash., 1911–
Soleduck River near Quillayute, Wash., 1897–1901.
Kalawa River near Forks, Wash., 1897–1901.

PUGET SOUND DRAINAGE BASINS.

Elwha River at McDonald, Wash., 1897–1901.
Elwha River near Port Angeles, Wash., 1911–12.
Dungeness River at Sequin, Wash., 1897–98.
Dungeness River at Dungeness, Wash., 1898–1901.
Dosewallips River at Brinnon, Wash., 1910–11.
Duckabush River near Duckabush, Wash., 1910–11.
Skokomish River, North Fork (head of Skokomish River), near Hoodsport, Wash., 1910–11.
Nisqually River near Ashford, Wash., 1910–1914.
Nisqually River near La Grande, Wash., 1906–1913.
Puyallup River near Electron, Wash., 1909–
Carbon River at Fairfax, Wash., 1910–1912.
White River below Forks, near Enumclaw, Wash., 1911–12.
White River at Buckley, Wash., 1899–1903; 1910–11; 1913–
Greenwater River at mouth, near Enumclaw, Wash., 1911–12.
White River flume at Buckley, Wash., 1913–

Green River at Kanaskat, Wash., 1911.
Cedar River at Vaughn Bridge, near Cedar Lake, Wash., 1898–99.
Cedar River at Cedar Lake, near North Bend, Wash., 1902–3.
Cedar River near Ravensdale, Wash., 1901–1912.
Cedar River at Clifford Bridge, near Ravensdale, Wash., 1895–1898.
Skykomish River, South Fork (head of Skykomish River), near Berlin, Wash., 1910–11.
Skykomish River, South Fork, near Index, Wash., 1902–1905; 1911–12; 1913–
Skykomish River at Sultan, Wash., 1910–11.
  Foss River near Skykomish, Wash., 1911.
    East Fork of Foss River near Skykomish, Wash., 1911.
  Miller Creek near Berlin, Wash., 1911–
    West Fork of Miller Creek near Berlin, Wash., 1911.
  North Fork of Skykomish River at Index, Wash., 1910–
  Snoqualmie River at Snoqualmie Falls, Wash., 1902–1906.
  Pilchuck Creek near Granite Falls, Wash., 1911.
Stilaguamish River, South Fork (head of Stilaguamish River), near Silverton, Wash., 1910–
Stilaguamish River, South Fork, near Robe, Wash., 1902–3.
Stilaguamish River, South Fork, near Granite Falls, Wash., 1911; 1913–
  Canyon Creek near Granite Falls, Wash., 1911–1913.
Skagit River at Reflector Bar, near Marblemount, Wash., 1913–
Skagit River near Marblemount, Wash., 1908–1914.
Skagit River near Sedro Woolley, Wash., 1908–
  Stetattle Creek near Marblemount, Wash., 1913–
  Cascade River near Marblemount, Wash., 1909–1913.
  Sauk River above Whitechuck River, near Darrington, Wash., 1910.
  Sauk River above Clear Creek, near Darrington, Wash., 1910–1913.
  Sauk River at Suiattle Crossing, near Sauk, Wash., 1910–1912.
    Whitechuck River near Darrington, Wash., 1910.
    Clear Creek near Darrington, Wash., 1910–11.
  Baker Lake (on Baker River) near Concrete, Wash., 1910–
  Baker River below Anderson Creek, near Concrete, Wash., 1910–
  Baker River at Concrete, Wash., 1910–
Whatcom Lake near Bellingham, Wash., 1913–14.
Whatcom Creek near Bellingham, Wash., 1910–1914.
Nooksak River, North Fork (head of Nooksak River), near Glacier, Wash., 1910–11.
Nooksak River near Deming, Wash., 1910–11.
  Middle Fork of Nooksak River at ranger station near Deming, Wash., 1910–11.
  Middle Fork of Nooksak River near Deming, Wash., 1910–11.

COLUMBIA RIVER BASIN.

Columbia River at Wenatches, Wash, 1910.
Columbia River near Julia, Wash., 1905.
Columbia River at Hanford, Wash., 1910.
Columbia River at Pasco, Wash., 1904–1910.
Columbia River at Cascade Locks and The Dalles, Oreg., 1878–
  Kootenai River at Libby, Mont., 1910–
  Kootenai River at Crossport, Idaho, 1904.
  Kootenai River near Bonners Ferry, Idaho, 1904.
  Kootenai River near Porthill, Idaho, 1904.
    Callahan Creek at Troy, Mont., 1911–
    Yaak River near Troy, Mont., 1910–
    Moyie River at Snyder, Idaho, 1911–

Columbia River tributaries—Continued.
Clark Fork at Missoula, Mont., 1898–1907.
Clark Fork at St. Regis, Mont., 1910–
Clark Fork near Plains, Mont., 1910–
Pend Oreille Lake at Sandpoint, Idaho, 1914–
Clark Fork at Priest River, Idaho, 1903–1905.
Clark Fork at Newport, Wash., 1904–1910.
Clark Fork at Metaline Falls, Wash., 1908–1910; 1912–
Racetrack Creek near Anaconda, Mont., 1911–12; 1914–
Little Blackfoot River and ditch near Elliston, Mont., 1910–
Rock Creek near Quigly, Mont., 1910–1912.
Big Blackfoot River at Bonner, Mont., 1898–1905.
Rattlesnake Creek at Missoula, Mont., 1898–1900.
Bitterroot River, West Fork (head of Bitterroot River), near Darby, Mont., 1910–
Bitterroot River near Grantsdale, Mont., 1902–1907.
Bitterroot River near Missoula, Mont., 1898–1901; 1903–4.
East Fork of Bitterroot River near Darby, Mont., 1910–
Lolo Creek near Lolo, Mont., 1910–
St. Regis River near St. Regis, Mont., 1910–
Flathead River near Columbia Falls, Mont., 1910–
Flathead River at Demersville, near Kalispell, Mont., 1910–1912.
Flathead River at Damon's ranch, near Kalispell, Mont., 1910–1912.
Flathead River at Keller's ranch, near Holt, Mont., 1910–1912.
Flathead Lake (on Flathead River) near Holt, Mont., 1900.
Flathead Lake at Polson, Mont., 1908–
Flathead River near Polson, Mont., 1907–
Middle Fork Flathead River at Belton, Mont., 1910–
Lake McDonald outlet at Lake McDonald, Mont., 1912–
South Fork of Flathead River near Columbia Falls, Mont., 1910–
Swan River near Big Fork, Mont., 1910–11.
Stillwater River near Kalispell, Mont., 1906–7.
Whitefish River near Kalispell, Mont., 1906.
Little Bitterroot River near Marion, Mont., 1910–
Little Bitterroot River near Hubbart, Mont., 1909–
Little Bitterroot Creek near Dayton, Mont., 1908–9.
Crow Creek near Ronan, Mont., 1906–
Crow Creek at Lozeau's ranch, near Ronan, Mont., 1911–
Mud Creek near Ronan, Mont., 1908–1910.
Mission Creek near St. Ignatius, Mont., 1906–
Dry Creek near St. Ignatius, Mont., 1908–
Post Creek at Fitzpatrick's ranch, near Ronan, Mont., 1906–1911.
Post Creek at Deschamp's ranch, near Ronan, Mont., 1911.
Post Creek near St. Ignatius, Mont., 1911–
Jocko River, South Fork (head of Jocko River), near Jocko, Mont., 1912–
Jocko River near Jocko, Mont., 1908–
Jocko River at Ravalli, Mont., 1906–1911.
Middle Fork of Jocko River near Jocko, Mont., 1912–
North Fork of Jocko River near Jocko, Mont., 1912–
Falls Creek near Jocko, Mont., 1912–
Big Knife Creek near Jocko, Mont., 1908–
Agency Creek near Jocko, Mont., 1908–
Blodgett Creek near Jocko, Mont., 1909–10.

Columbia River tributaries—Continued.
Chelan River at Chelan, Wash., 1903–
Railroad Creek at Lucerne, Wash., 1910–1913.
Entiat River at Entiat, Wash., 1910–
Wenatchee River near Leavenworth, Wash., 1910–
Wenatchee River at Dryden, Wash., 1909–
Wenatchee River at Cashmere, Wash., 1904–1911.
Wenatchee River at Wenatchee, Wash., 1897.
White River near Chiwaukum, Wash., 1911–12; 1914–
Nason Creek near Nason, Wash., 1911.
Chiwawa Creek near Leavenworth, Wash., 1911–12; 1913–14.
Chiwaukum Creek near Chiwaukum, Wash., 1911.
Icicle Creek near Leavenworth, Wash., 1911–1914.
Peshastin Creek at Blewett, Wash., 1911–12.
Peshastin Creek near Leavenworth, Wash., 1911–12.
Wenatchee Valley canal at Dryden, Wash. (irrigation seasons only), 1911–
Crab Creek at Wilson Creek, Wash., 1904.
Crab Creek at Adrian, Wash., 1910; 1911; 1912.
Crab Creek near Ephrata, Wash., 1909.
Moses Lake at Neppel, Wash., 1909–
Crab Creek near Warden, Wash., 1909–1912.
Rockyford Creek near Ephrata, Wash., 1909–1911.
Keechelus Lake (on Yakima River) near Martin, Wash., 1906–
Yakima River near Martin, Wash., 1903–
Yakima River at Easton, Wash., 1904; 1910–
Yakima River at Cle Elum, Wash., 1906–
Yakima River at Umtanum, Wash., 1906–
Yakima River at Selah Gap, near North Yakima, Wash., 1904; 1911; 1912.
Yakima River at Union Gap, near Yakima City, Wash., 1893–1909; 1911–
Yakima River near Wapato, Wash., 1908–
Yakima River at Mabton, Wash., 1904–1906; 1911–12.
Yakima River near Prosser, Wash., 1904–1906; 1913–
Yakima River at Kiona, Wash., 1895–
Yakima River near Richland, Wash., 1906–1911.
Cabin Creek near Easton, Wash., 1909–1911.
Kachess Lake (on Kachess River) near Easton, Wash., 1905–
Kachess River near Easton, Wash., 1903–
Big Creek near Cle Elum, Wash., 1909.
Cle Elum River, North Fork (head of Cle Elum River), at Galena, Wash., 1907; 1911.
Cle Elum Lake near Roslyn, Wash., 1906–
Cle Elum River near Roslyn, Wash., 1903–
Teanaway River below Forks, near Cle Elum, Wash., 1911–12.
Teanaway River near Cle Elum, Wash., 1909–1911; 1912–
Swauk Creek near Cle Elum, Wash., 1909–1912.
Cascade canal near Ellensburg (Thorp), Wash., 1905–6; 1909–1911.
West Kittitas canal near Thorp, Wash., 1904–1906; 1909–1911.
Ellensburg Water Co. canal near Ellensburg, Wash., 1904–5; 1909–1911.
Taneum Creek near Thorp, Wash., 1909–1912.
Manastash Creek near Ellensburg, Wash., 1909–
Wilson Creek near Thrall, Wash., 1911.
Selah Moxee canal near Selah, Wash., 1904–5; 1909–1911.
Wenas Creek near Selah, Wash., 1909–1912.
Naches River at Anderson's ranch, near Nile, Wash., 1909–

Columbia River tributaries—Continued.
Yakima River tributaries—Continued.
Naches River at Oak Flat, near Nile, Wash, 1904–
Naches River below Tieton River, near Naches, Wash., 1905; 1909–1912.
Naches River near North Yakima, Wash, 1893–1897; 1898–1912.
Bumping Lake (on Bumping River) near Nile, Wash., 1909; 1910–
Bumping River at Bumping Lake, near Nile, Wash., 1906; 1909–
American River near Nile, Wash., 1909; 1910; 1911; 1913; 1914.
Selah Valley canal near Naches, Wash., 1904–5; 1909–1912.
Tieton River, North Fork, below Clear Creek, near Naches, Wash., 1914–
Tieton River at McAllister Meadows, near Naches, Wash., 1908–
Tieton River at headworks of Tieton canal, near Naches, Wash., 1906–
Tieton River at Cobb's ranch, near Naches, Wash., 1902–1907; 1909–1913.
Tieton canal near Naches, Wash., 1910–
Wapatox canal near Naches, Wash., 1904–5; 1909–1911.
Naches Canal Co. (Gleed) canal near Naches, Wash., 1904–1906; 1909–1911.
Yakima Valley (Congdon) canal near Naches, Wash., 1904–1906; 1909–1911.
Naches–Cowiche canal near Naches, Wash., 1904–1906; 1909–1911.
North Yakima power canal near North Yakima, Wash., 1904–1906; 1909–10.
Schanno canal near North Yakima, Wash., 1904–5; 1909–1911.
North Yakima power waste at North Yakima, Wash., 1909–1911.
North Yakima mill waste at North Yakima, Wash., 1909–1911.
Naches Avenue Union canal at North Yakima, Wash., 1904–1906; 1909–1911.
Old Union canal near North Yakima, Wash., 1904–1906; 1909–1911.
Moxee Co. canal near North Yakima, Wash., 1904–1906; 1909–1911.
Fowler canal near North Yakima, Wash., 1904–1906; 1909–1911.
Ahtanum Creek, North Fork (head of Ahtanum Creek), near Tampico, Wash., 1907–
Ahtanum Creek at The Narrows, near Tampico, Wash., 1908–1913.
Ahtanum Creek near Yakima City, Wash., 1904; 1907–1912.
South Fork of Ahtanum Creek near Tampico, Wash., 1907–1914.
New Reservation canal near Parker (Yakima City), Wash., 1904–
Old Reservation canal near Parker (Wapato), Wash., 1904–
Sunnyside canal near Wapato, Wash., 1904–
Toppenish Creek near Fort Simcoe, Wash., 1909–
Toppenish Creek near White Swan (Wapato), Wash., 1909–1912.
Toppenish Creek at railway bridge, near Toppenish, Wash., 1894–1896.
Toppenish Creek near Toppenish, Wash., 1908–9.
Toppenish Creek at Alfalfa, Wash., 1909–1912.
Simcoe Creek near Fort Simcoe, Wash., 1909–
Reservation drain at Alfalfa, Wash., 1912–
Satus Creek near Toppenish, Wash., 1908–1913.
Satus Creek below mouth of Dry Creek near Toppenish, Wash., 1913–
Satus Creek near Alfalfa, Wash., 1905.
Satus Creek near Satus, Wash., 1894–1896.
Kiona Canal near Kiona, Wash., 1904–1906; 1908–1911.
Kennewick Canal near Richland, Wash., 1904–5; 1910–11.
Lower Yakima Canal near Kiona, Wash., 1905; 1910–11.
Snake River at south boundary of Yellowstone National Park, 1913–
Jackson Lake (Snake River) near Moran, Wyo., 1909–10 (fragmentary); 1911–

Columbia River tributaries—Continued.
- Snake River [1] near Moran, Wyo., 1903–
- Snake River [1] at Grovant, Wyo., 1899.
- Snake River [1] near Lyon, Idaho, 1903–1911.
- Snake River [1] near Heise, Idaho, 1910–
- Snake River at Idaho Falls, Idaho, 1889–1894.
- Snake River near Blackfoot, Idaho, 1910–
- Snake River at Neeley, Idaho, 1906–
- Snake River at Howells Ferry, near Minidoka, Idaho, 1910–
- Snake River at Montgomery Ferry, near Minidoka, Idaho, 1895–1899; 1901–1910.
- Lake Milner (on Snake River) at Milner, Idaho, 1911–
- Snake River at Milner, Idaho, 1909–
- Snake River near Twin Falls, Idaho, 1911–
- Snake River near Hagerman, Idaho, 1912–
- Snake River at King Hill, Idaho, 1909–
- Snake River near Murphy, Idaho, 1912; 1913–
- Snake River at Weiser, Idaho, 1910–
- Snake River at Lewiston, Idaho, 1910.
- Snake River near Burbank, Wash., 1907–
  - Pacific Creek near Moran, Wyo., 1906.
  - Buffalo River near Elk, Wyo., 1906.
  - Henrys Fork [2] at Warm River, Idaho, 1910–
  - Henry Fork near Ora, Idaho, 1902–1909.
  - Henrys Fork in canyon, above Fall River, Idaho, 1890–91.
  - Henrys Fork near Rexburg, Idaho, 1909–
    - Warm River at Warm River, Idaho, 1912–
      - Robinson Creek at Warm River, Idaho, 1912–
    - Fall River near Marysville, Idaho, 1902–3.
    - Fall River at Fremont, Idaho, 1904–1909 (replaces Marysville station).
    - Fall River at Canyon, Idaho, 1890–1901.
    - Teton River near St. Anthony, Idaho, 1903–1909.
    - Teton River at Chase's ranch, Idaho, 1890–1893.
  - Idaho canal near Shelly, Idaho, 1912–
  - Idaho canal near Firth, Idaho, 1914–
  - Willow Creek near Prospect, Idaho, 1903–4.
  - Blackfoot River above the reservoir, near Henry, Idaho, 1914–
  - Blackfoot marsh reservoir near Henry, Idaho, 1912–
  - Blackfoot River below reservoir, near Henry [near Rossfork], Idaho, 1908–
  - Blackfoot River near Shelley, Idaho, 1909–
  - Blackfoot River near Presto, Idaho, 1903–1909.
  - Blackfoot River near Blackfoot, Idaho (fragmentary), 1913; 1914.
    - Little Blackfoot River at Henry, Idaho, 1914–
      - Meadow Creek near Henry, Idaho, 1914–
    - Fort Hall upper canal near Blackfoot, Idaho, 1912–
    - Fort Hall lower canal near Blackfoot, Idaho, 1912–
  - Big Lost River near Chilly, Idaho, 1904–1906; 1907–
  - Big Lost River near Mackay, Idaho, 1903–1906; 1912–
    - Thousand Springs Creek near Chilly, Idaho, 1912–13; 1914–
    - Sharp ditch near Mackay, Idaho, 1912–
    - Streeter ditch near Mackay, Idaho, 1913–
    - Cedar Creek above forks, near Mackay, Idaho, 1911–1913.
    - Cedar Creek below forks, near Mackay, Idaho, 1911–1913.
    - Antelope Creek near Darlington, Idaho, 1913–

[1] Decision of United States Geographic Board; formerly called South Fork of Snake River.
[2] Decision of United States Geographic Board; formerly called North Fork of Snake River.

Columbia River tributaries—Continued.
Snake River tributaries—Continued
Big Lost River tributaries—Continued.
Little Lost River near Clyde, Idaho, 1910–1913.
Birch Creek near Kaufman, Idaho, 1910–1912.
Camas Creek near Hamer, Idaho, 1912–13.
Portneuf River above reservoir, near Chesterfield, Idaho, 1912–
Portneuf diversion channel near Chesterfield, Idaho, 1914–
Portneuf River below reservoir, near Chesterfield, Idaho, 1912–
Portneuf River near Pebble, Idaho, 1910–1913.
Portneuf River at Topaz, Idaho, 1913–
Portneuf River near McCammon, Idaho, 1896.
Portneuf River at Pocatello, Idaho, 1897–1899; 1911–
Topons Creek near Chesterfield, Idaho, 1912–
Pebble Creek near Pebble, Idaho, 1911–1914.
Birch Creek near Downey, Idaho, 1911–1914.
Raft River near Bridge, Idaho, 1909–
Clear Creek near Naf, Idaho, 1910–11; 1912.
Cassia Creek near Conant, Idaho, 1909–1912.
North Side Minidoka canal near Minidoka, Idaho, 1909–
South Side Minidoka canal near Minidoka, Idaho, 1909–
Goose Creek above Trapper Creek, near Oakley, Idaho, 1911–
Goose Creek near Oakley, Idaho, 1909–1911.
Trapper Creek near Oakley, Idaho, 1911–
Birch Creek near Oakley, Idaho, 1912.
North Side Twin Falls canal at Milner, Idaho, 1909–
South Side Twin Falls canal at Milner, Idaho, 1909–
Big Cottonwood Creek near Oakley, Idaho, 1909–
Dry Creek near Artesian City, Idaho, 1912.
Rock Creek near Rock Creek, Idaho, 1909–
McMullen Creek near Rock Creek, Idaho, 1910; 1912.
Salmon Falls Creek above upper Vineyard ditch, near Contact, Nev., 1914.
Salmon Falls Creek below upper Vineyard ditch, near Contact, Nev., 1914.
Salmon Falls Creek below High Line canal, near San Jacinto, Nev., 1914.
Salmon Falls Creek near San Jacinto, Nev., 1909–
Salmon Falls Creek near Twin Falls, Idaho, 1909–10.
Upper Vineyard ditch near Contact, Nev., 1914.
Lower Vineyard ditch near Contact, Nev., 1914.
Jakes Creek above Hubbard ranch, near Contact, Nev., 1914.
Jakes Creek below Hubbard ranch, near Contact, Nev., 1914.
Willow Creek near Contact, Nev., 1914.
Bird's Nest ditch near Contact, Nev., 1914.
Harrell ditch near Contact, Nev., 1914.
High Line ditch near San Jacinto, Nev., 1914.
San Jacinto ditch near San Jacinto, Nev., 1914.
Island ditch near San Jacinto, Nev., 1914.
West Boar's Nest ditch near San Jacinto, Nev., 1914.
Trout Creek near San Jacinto, Nev., 1914.
East Boar's Nest ditch near San Jacinto, Nev., 1914.
Shoshone Creek near San Jacinto, Nev., 1914.
North Side ditch near San Jacinto, Nev., 1914.
Cedar Creek near Roseworth, Idaho, 1909–
Devil Creek near Three Creek, Idaho, 1912–1914.

Columbia River tributaries—Continued.
Snake River tributaries—Continued.
Boise River tributaries—Continued.
Moore Creek:
Grimes Creek near Centerville, Idaho, 1910.
Dry Creek:
Spring Creek near Boise, Idaho, 1911–12.
Wilson ditch near Ontario, Oreg., 1904–5.
Malheur River near Drewsey, Oreg., 1914.
Malheur River above South Fork, at Riverside, Oreg., 1906–7; 1908–1910.
Malheur River at Riverside, Oreg., 1909–
Malheur River near Namorf, Oreg., 1913–
Malheur River near Harper ranch, near Westfall, Oreg., 1903–1905.
Malheur River near Little Valley, Oreg., 1914–
Malheur River at McLaughlin bridge, near Vale, Oreg., 1904–1906.
Malheur River at Vale, Oreg., 1890–91; 1895–96; 1903–
Malheur River at Halliday bridge, near Ontario, Oreg., 1904–5.
Malheur River near Ontario, Oreg., 1903–4.
South Fork of Malheur River at Riverside, Oreg., 1910–1913; 1913.
North Fork of Malheur River at Scotts ranch, near Beulah, Oreg., 1914.
North Fork of Malheur River at Foley's ranch, near Beulah, Oreg., 1909–1912; 1913–14.
Vines ditch near Little Valley, Oreg., 1904–5; 1914.
Malheur Farmer's canal above Vale, Oreg., 1904–5.
McLaughlin ditch above Vale, Oreg., 1904–5.
"J. H." ditch above Vale, Oreg., 1904–5.
Gellerman & Frohman ditch above Vale, Oreg., 1904–5.
Sand Hollow ditch above Vale, Oreg., 1904–5.
Bully Creek near Westfall, Oreg., 1911; 1913.
Bully Creek at Warm Springs, near Vale, Oreg., 1903–4; 1905–1907; 1911–
Bully Creek at Vale, Oreg., 1904–5.
Hope Mill ditch at Vale, Oreg., 1904–5.
Willow Creek near Malheur, Oreg., 1904–6; 1910–11; 1912–
Willow Creek near Brogan, Oreg., 1910–
Willow Creek at Dell, Oreg., 1904–1906.
Cow Creek near Brogan, Oreg., 1912–
Pole Creek near Brogan, Oreg., 1912–13.
Nevada ditch below Vale, Oreg., 1904–5.
Payette River near Horseshoe Bend, Idaho, 1906–
Payette River at Payette, Idaho, 1895–1897.
North Fork of Payette River at Lardo, Idaho, 1908–
North Fork of Payette River at Van Wyck, Idaho, 1912–
Lake Fork of Payette River near McCall, Idaho, 1909–1914.
Shafer Creek near Horseshoe Bend, Idaho, 1911–12.
Harris Creek near Horseshoe Bend, Idaho, 1911–12.
Weiser River near Weiser, Idaho, 1890–91; 1894–1904; 1910–
Weiser River, West Fork, near Fruitvale, Idaho, 1910–1913.
Lost Creek near Tamarack, Idaho, 1910–
Middle Fork of Weiser River at Middle Fork, Idaho, 1910–1913.
Sage Creek near Midvale, Idaho, 1913.
Sommercamp Creek near Midvale, Idaho, 1913.
Miller Creek near Midvale, Idaho, 1913.
Crane Creek near Midvale, Idaho, 1910–
Mann Creek near Weiser, Idaho, 1911–1913.
Monroe Creek (upper station) near Weiser, Idaho, 1911–12.
Monroe Creek (lower station) near Weiser, Idaho, 1911–1913.

Columbia River tributaries—Continued.
Deschutes River at Forest Service bridge, near Lapine, Oreg., 1910; 1912–1913.
Deschutes River near Lava, Oreg., 1905–1907; 1909–1911; 1912; 1913–
Deschutes River at West's ranch, near Lava, Oreg., 1906–1909; 1914.
Deschutes River at Benham Falls, Oreg., 1909–1914.
Deschutes River at Bend, Oreg., 1904–
Deschutes River at Tumalo [Laidlaw], Oreg., 1909–1912; 1914.
Deschutes River near Cline Falls, Oreg., 1910–11; 1912–13.
Deschutes River at Mecca, Oreg., 1911–
Deschutes River at Sherar, Oreg., 1912–1914.
Deschutes River at Moro, Oreg., 1897–1899.
Deschutes River at Moody (Biggs), Oreg., 1906–
Odell Creek near Crescent, Oreg., 1911; 1912; 1913; 1914.
Fall River near Lapine, Oreg., 1912.
East Fork at Crescent, Oreg., 1904–1908; 1910–11; 1913–14.
East Fork at Morson's intake, near Lapine, Oreg., 1914.
East Fork near Lapine, Oreg., 1910–1913.
East Fork at Allen's ranch, near Lava, Oreg., 1905–1912; 1913–
Crescent Creek at outlet of Crescent Lake, near Crescent, Oreg., 1911; 1912–
Crescent Creek below Cold Creek, near Crescent, Oreg., 1912–13.
Crescent Creek near Crescent, Oreg., 1912–13; 1914–
Big Marsh Creek near Crescent, Oreg., 1912–1914.
Arnold canal near Bend, Oreg., 1914.
Central Oregon canal near Bend, Oreg., 1905–
Pilot Butte canal near Bend, Oreg., 1905–
North canal near Bend, Oreg., 1913–
Swalley canal near Bend, Oreg., 1913–
Tumalo Creek near Tumalo [Laidlaw], Oreg., 1906–1914.
Tumalo Creek near Bend, Oreg., 1906–
Lewis Creek near Tumalo [Laidlaw], Oreg., 1908–9.
Wimer canal near Tumalo [Laidlaw], Oreg., 1906–
Columbia Southern canal near Tumalo [Laidlaw], Oreg., 1906–1914.
Tumalo feed canal near Bend, Oreg., 1914–
Squaw Creek near Sisters, Oreg., 1906–
McAllister's ditch near Sisters, Oreg., 1909–1913.
Crooked River near Post, Oreg., 1908–1911.
Crooked River at Hoffman's ranch near Prineville, Oreg., 1914–
Crooked River near Prineville, Oreg., 1908–1912.
Crooked River at Prineville, Oreg., 1914.
Prineville flour mill tailrace at Prineville, Oreg., 1914–
Ochoco Creek near Howard, Oreg., 1910–11.
Ochoco Creek at Elliot's ranch, near Prineville, Oreg., 1908–1910.
Ochoco Creek at Prineville, Oreg., 1912; 1913–14.
Elliot ditch near Prineville, Oreg., 1908–1910.
Metolius River at Allingham ranger station, near Sisters, Oreg., 1910–1913.
Metolius River at Hubbard's ranch, near Grandview, Oreg., 1910–1913.
Metolius River at Rigg's ranch, near Sisters, Oreg., 1908–1912.
Lake Creek near Sisters, Oreg., 1911–1913.
Whitewater River near Grandview, Oreg., 1911–1913.
Shitike Creek at Warmspring, Oreg., 1911–
Warm Springs River near Warmspring, Oreg., 1911–
White River near Tygh Valley, Oreg., 1911–
Tygh Creek at Tygh Valley, Oreg., 1911–1913.
Klickitat River above Pearl Creek, near Glenwood, Wash., 1910.

Columbia River tributaries—Continued.
- Klickitat River at Camp Klickitat, Wash., 1907–1908.
- Klickitat River near Glenwood, Wash., 1909–.
- Klickitat River at Hanson's cable, near Klickitat, Wash., 1908–9.
- Klickitat River at Klickitat (Wright), Wash., 1909–1912.
- Klickitat River at Wols Ferry, near Lyle, Wash., 1907–1910.
- Klickitat River at Lyle, Wash., 1912.
  - West Fork of Klickitat River near Glenwood, Wash., 1910.
  - Big Muddy River above mouth of Cougar Creek, near Wright, Wash., 1905 1908.
  - Little Klickitat River near Goldendale, Wash., 1910–1912.
- Hood River at Dee, Oreg., 1913–
- Hood River at Winans, Oreg., 1905–1907; 1910–1912; 1913.
- Hood River at Tucker Bridge, Oreg., 1897–1899; 1913–
- Hood River at Powerdale, near Hood River, Oreg., 1913–
  - East Fork of Hood River near Mount Hood, Oreg., 1913–
    - East Fork irrigation district canal near Mount Hood, Oreg., 1913–
  - West Fork of Hood River near Dee, Oreg., 1913–
  - Pacific Light & Power Co. tailrace near Hood River, Oreg., 1914–
- White Salmon River at splash dam near Trout Lake, Wash., 1912–
- White Salmon River at Husum, Wash., 1909–
- White Salmon River at Condit dam, near Underwood, Wash., 1912–13.
  - Trout Creek at Guler, Wash., 1909–1911.
- Little White Salmon River below Lava Creek, near Cook, Wash., 1903–1906.[1]
- Little White Salmon River near Cooks, Wash., 1909.
- Latourell Creek at Latourell, Oreg., 1912–13.
- Sandy River above Salmon River, at Brightwood, Oreg., 1910–1914.
- Sandy River below Salmon River, near Brightwood, Oreg., 1907–1911.
- Sandy River near Marmot, Oreg., 1911–
- Sandy River above Bull Run River, near Bull Run, Oreg., 1910–1912.
- Sandy River below Bull Run River, near Bull Run, Oreg., 1910–1914.
  - Clear Fork of Sandy River near Welches, Oreg., 1913; 1914.
  - Lost Creek near Brightwood, Oreg., 1913–
  - Still Creek near Rowe, Oreg., 1910–1912.
  - Salmon River near Rowe, Oreg., 1910–1912.
  - Salmon River at Welches, Oreg., 1913–14.
  - Salmon River at Fish Hatchery, near Brightwood, Oreg., 1912–13.
  - Bull Run River near Bull Run, Oreg., 1895–
    - Little Sandy River near Marmot, Oreg., 1913–
    - Little Sandy River near Bull Run, Oreg., 1911–1913.
      - Little Sandy flume near Bull Run, Oreg., 1912–13.
- Willamette River, Middle Fork (head of Willamette River), above Salt Creek, near Oakridge, Oreg., 1913–14.
- Willamette River, Middle Fork, below North Fork, near Oakridge, Oreg., 1911–12.
- Willamette River, Middle Fork, at Jasper, Oreg., 1905–1912; 1913–
- Willamette River at Springfield, Oreg., 1911–1913.
- Willamette River at Albany, Oreg., 1878–1880; 1892–
- Willamette River at Salem, Oreg., 1909–
- Willamette River at Oregon City, Oreg., 1909–
  - Salt Creek near Oakridge, Oreg., 1913–14.
  - Salmon Creek near Oakridge, Oreg., 1913–
  - North Fork of Middle Fork of Willamette River near Oakridge (Hazeldell), Oreg., 1909–1912; 1913–

[1] Results published in U. S. Geol. Survey Water-Supply Paper 272, pp. 428–429.

Columbia River tributaries—Continued.
Willamette River tributaries—Continued.
Fall Creek near Fall Creek, Oreg., 1911.
Coast Fork of Willamette River near Goshen, Oreg., 1905–1912.
Row River near Disston, Oreg., 1910–1913.
McKenzie River at Clear Lake, Oreg., 1912–
McKenzie River at McKenzie Bridge, Oreg., 1910–
McKenzie River at Martins Rapids, Oreg., 1910–11.
McKenzie River near Springfield, Oreg., 1905–
Eugene power canal near Walterville, Oreg., 1912–
North Santiam River near Hoover, Oreg., 1910–1913.
North Santiam River at Detroit, Oreg., 1907–1909.
North Santiam River at Niagara, Oreg., 1908–1913.
North Santiam River at Mehama, Oreg., 1905–1907; 1910–1914.
Santiam River at Jefferson, Oreg., 1905–6; 1908–
Marion Fork of Santiam River at Marion Lake, near Hoover, Oreg., 1907; 1909–1912.
Puzzle Creek near Detroit (Hoover), Oreg., 1907; 1909.
North Fork of Puzzle Creek near Hoover, Oreg., 1909–1912.
South Fork of Puzzle Creek near Hoover, Oreg., 1909–1912.
Pamelia Creek near Detroit, Oreg., 1907; 1909; 1913.
Whitewater Creek near Detroit, Oreg., 1907; 1913.
Breitenbush Creek near Detroit, Oreg., 1910–1913.
South Santiam River near Cascadia, Oreg., 1910–1913.
South Santiam River near Foster, Oreg., 1911.
South Santiam River at Waterloo, Oreg., 1905–1907; 1910–11.
Middle Santiam River near Foster, Oreg., 1911.
Luckiamute River near Suver, Oreg., 1905–1911.
Yamhill River, South Fork (head of Yamhill River), at Sheridan, Oreg., 1906–1913.
Yamhill River at La Fayette, Oreg., 1908–
Molalla River near Molalla, Oreg., 1905–1909.
Clackamas River near Cazadero, Oreg.,[1] 1909–
Clackamas River at Estacada, Oreg., 1908–1911.
Clackamas River near Barton, Oreg. (replaced by Estacada station), 1905–1908.
Clackamas River at Park Place, Oreg., 1911–12.
Oak Grove Fork of Clackamas River at Timothy Meadows, near Cazadero, Oreg., 1913–
Oak Grove Fork of Clackamas River at intake, near Cazadero, Oreg., 1909–
Lewis River above Muddy River near Cougar, Wash., 1909.
Lewis River near Cougar, Wash., 1909–1912.
Lewis River near Amboy, Wash., 1911–
Lewis River at Ariel, Wash., 1909.
Muddy River at mouth, near Cougar, Wash., 1909.
Pine Creek at mouth, near Cougar, Wash., 1909.
Swift Creek at mouth, near Cougar, Wash., 1909.
Kalama River near Kalama, Wash., 1911–1913.
Ohanapecosh River near Lewis, Wash., 1907–
Cowlitz River at Lewis, Wash., 1911–
Cowlitz River at Mossyrock, Wash., 1912–
Cowlitz River at Randle, Wash., 1910–1912.

[1] Evaporation records 1909–10.

Columbia River tributaries—Continued.
Cowlitz River at Mayfield, Wash., 1910–11.
Clear Fork, near Lewis, Wash., 1907–
Coal Creek, near Lewis, Wash., 1911–
Lake Creek at outlet of Packwood Lake, near Lewis, Wash., 1911–
Lake Creek at mouth, near Lewis, Wash., 1907–.
Johnson Creek below West Fork, near Lewis, Wash., 1911; 1913–14.
Johnson Creek at mouth, near Lewis, Wash., 1911–1914.
Hagar Creek near Lewis, Wash., 1911–12; 1913–14.
North Fork of Hagar Creek near Lewis, Wash., 1911–12; 1913–14.
Cispus River near Randle, Wash., 1910–1912.
Toutle River at St. Helen, Wash., 1909.
Toutle River near Castle Rock, Wash., 1909–1912.

STREAMS BETWEEN COLUMBIA RIVER AND KLAMATH RIVER.

Rogue River near Prospect, Oreg., 1907–1912.
Rogue River near Trail, Oreg., 1910–1913.
Rogue River near Tolo, Oreg., 1905–
Rogue River near Galice, Oreg., 1906.
Mill Creek near Prospect, Oreg., 1910.
Butte Creek, South Fork (head of Butte Creek), at Butte Falls, Oreg., 1910–11.
Little Butte Creek, South Fork (head of Little Butte Creek), near Lake Creek, Oreg., 1910–1913.
Little Butte Creek near Eagle Point, Oreg., 1907–
Rogue River Valley canal near Brownsboro, Oreg., 1913; 1914–
North Fork of Little Butte Creek, near Lake Creek, Oreg., 1911–1913.
Bear Creek at Talent, Oreg., 1907–1914.
Neil Creek near Ashland, Oreg., 1913.
George Dunn ditch near Ashland, Oreg., 1913.
Ashland Creek at Ashland, Oreg., 1913.
Wagner Creek near Talent, Oreg., 1913.
Evans Creek at Wimer, Oreg., 1913.
Applegate River near Buncom, Oreg., 1911–1914.
Applegate River at Murphy, Oreg., 1907–1910.
Cameron ditch near Buncom, Oreg., 1911–1914.
East Fork of Little Applegate River near Buncom, Oreg., 1913.
Little Applegate River near Ruch, Oreg., 1913.
West Fork of Little Applegate River near Buncom, Oreg., 1913.
Spicer ditch near Buncom, Oreg., 1913.
Thompson Creek near Applegate, Oreg., 1913.
Slate Creek at Wonder, Oreg., 1913.
Grave Creek near Placer, Oreg., 1913.
South Umpqua River (head of Umpqua River) near Tiller, Oreg., 1910–11.
South Umpqua River near Brockway, Oreg., 1905–1912.
Umpqua River near Elkton, Oreg., 1905–
Cow Creek at Riddle, Oreg., 1911–12.
North Umpqua River near Hoaglin, Oreg., 1910–1912; 1914.
North Umpqua River at Winchester (Oakcreek), Oreg., 1905–
Calapooya Creek near Sutherlin, Oreg., 1912–13.
Luse canal near Sutherlin, Oreg., 1912–13.
Mill Creek near Ash., Oreg., 1907–1912.
Siletz River at Siletz, Oreg., 1905–1912.
Wilson River:
North Fork of Wilson River near Tillamook, Oreg., 1913–
Nehalem River at Salmonberry, near Balm, Oreg., 1913–14.

REPORTS ON WATER RESOURCES OF THE NORTH PACIFIC SLOPE DRAINAGE BASINS.

PUBLICATIONS OF UNITED STATES GEOLOGICAL SURVEY.

WATER-SUPPLY PAPERS.

Water-supply papers are distributed free by the Geological Survey as long as its stock lasts. An asterisk (*) indicates that this stock has been exhausted. Many of the papers marked in this way may, however, be purchased (at price noted) from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C. Omission of the price indicates that the report is not obtainable from Government sources. Water-supply papers are of octavo size.

*4. A reconnaissance in southeastern Washington, by I. C. Russell, 1897. 96 pp., 7 pls. 15c.

Describes an area "bordered on the south by Oregon, on the east by Idaho, on the north by Snake River, and on the west by the Columbia," and "briefly designated as lying south of Snake River"; discusses climate, vegetation, topography and drainage, geologic formations—including the river terraces and soils—irrigation, and the artesian water supply, and gives an outline sketch of the geological history of the region.

*53. Geology and water resources of Nez Perce County, Idaho, Part I, by I. C. Russell. 1901. 85 pp., 10 pls. 10c.

*54. Geology and water resources of Nez Perce County, Idaho, Part II, by I. C. Russell. 1901. 87–141 pp.

Nos. 53 and 54 relate to an area "in western Idaho, bordered on the west by portions of Washington and Oregon," drained through Snake River to the Columbia; they describe the topography, geology, and soils of the region, discuss the relation of the surface features—plateaus, canyons, streams, etc.—to the geology and the climate, the source and quantity of the water supply, including springs and artesian wells, and refer briefly to the occurrence of building stones, lignite, gold, silver, and copper. They include also a short bibliography of artesian waters and two appendices—one giving list of elevations, and the other notes concerning Portland cement.

55. Geology and water resources of a portion of Yakima County, Wash., by G. O. Smith. 1901. 68 pp., 7 pls. 10c.

Describes topography, climate, soil, agriculture, geology, and surface and underground waters of an area comprising about 50 square miles in the vicinity of North Yakima; discusses in some detail the artesian basins and wells.

57. Preliminary list of deep borings in the United States, Part I (Alabama-Montana), by N. H. Darton. 1902. 60 pp. (See No. 149.) 5c.

61. Preliminary list of deep borings in the United States, Part II (Nebraska-Wyoming), by N. H. Darton. 1902. 67 pp. 5c.

Nos. 57 and 61 contain information as to depth, diameter, yield, and head of water in borings more than 400 feet deep; under head "Remarks" gives information concerning temperature, quality of water, purposes of boring, etc. The lists are arranged by States, and the States are arranged alphabetically. A second, revised, edition was published in 1905 as Water-Supply Paper 149 (q. v.). 5c.

78. Preliminary report on artesian basins in southwestern Idaho and southeastern Oregon, by I. C. Russell. 1903. 53 pp., 2 pls. 5c.

Discusses briefly the rocks and geologic structure of a part of the Snake River Plains in Canyon and Owyhee counties, Idaho, and Malheur and Harney counties, Oreg.; describes briefly the condition on which artesian flow depends, and in some detail the springs and drilled wells in the Lewis, Otis, Harney, and Whitehorse artesian basins; also describes artesian wells in alluvial deposits and discusses the size of drill holes, casings, etc., the preservation of well records, and the importance of laws to govern the use of artesian waters; gives list of publications bearing on artesian waters.

93. Proceedings of first conference of engineers of the Reclamation Service, with accompanying papers, compiled by F. H. Newell, chief engineer, 1904. 361 pp. 25c. [Inquiries concerning this report should be addressed to the Reclamation Service.] Contains:

Investigations in Idaho, by D. W. Ross. Describes the irrigable lands in the area drained by Snake River.

Investigations in Oregon, by J. T. Whistler. Mentions the Umatilla, Malheur, and Harney projects.

Work in Washington, by T. A. Noble. Describes the plains of Columbia River.

96. Destructive floods in the United States in 1903, by E. C. Murphy. 1904. 81 pp., 13 pls. 15c.

Gives an account of a flood (commonly spoken of as the "Heppner disaster") on Willow Creek, a tributary of Columbia River, in Morrow County, Oreg.

111. Preliminary report on the underground waters of Washington, by Henry Landes. 1905. 85 pp., 1 pl. 10c.

Describes, by counties, the municipal water supplies, deep wells, and springs in the State, giving also for each county, a brief account of the climate, rainfall, topography, drainage, and geology.

118. Geology and water resources of a portion of east-central Washington, by F. C. Calkins. 1905. 96 pp., 4 pls. 5c.

Describes briefly the topography, geology, climate, vegetation, grazing, and agriculture on the Columbia Plains and in the Kittitas Valley; discusses the streams, springs, and shallow and deep wells.

149. Preliminary list of deep borings in the United States, second edition, with additions, by N. H. Darton. 1905. 175 pp. 10c.

Gives, by States (and within the States by counties), location, depth, diameter, yield, height of water, and other available information, concerning wells 400 feet or more in depth; includes all wells listed in Water-Supply Papers 57 to 61; mentions also principal publications relating to deep borings.

*162. Destructive floods in the United States in 1905, with a discussion of flood discharge and frequency and an index to flood literature, by E. C. Murphy and others. 1906. 105 pp., 4 pls. 15c.

Gives estimates (p. 85) of flood discharge and frequency for Boise River at Boise and Weiser River at Weiser, Idaho; also index to literature on floods on American streams.

*231. Geology and water resources of the Harney Basin region, Oregon, by G. A. Waring. 1909. 93 pp., 5 pls. 25c.

The greater part of the area covered by this report is in the Great Basin, but a small tract in the northeastern corner is drained by a number of small streams that are tributary to Malheur River.

253. Water powers of the Cascade Range, Part I: Southern Washington, by J. C. Stevens. 1910. 94 pp., 21 pls. 40c.

Discusses conditions governing hydraulic development, water laws of Washington, and variations in streams; describes the drainage basins of Klickitat, White Salmon, Little White Salmon, Lewis, and Toutle rivers; gives results of observations at gaging stations, estimates of average minimum discharge, and of the available horsepower at the power sites.

274. Some stream waters of the western United States, with chapters on sediment carried by the Rio Grande and the industrial application of water analyses, by Herman Stabler. 1911. 188 pp. 15c.

Describes collection of samples, plan of analytical work, and methods of analyses; discusses soap-consuming power of waters, water softening, boiler waters, and water for irrigation; gives results of analyses of waters of Boise, Malheur, Payette, and Palouse rivers, and Salmon Creek.

313. Water powers of the Cascade Range, Part II.—Cowlitz, Nisqually, Puyallup, White, Green, and Cedar drainage basins, by F. F. Henshaw and G. L. Parker. 1913. 170 pp., 16 pls. 55c.

Describes the geologic features and history of the drainage basins, topography and drainage, soils and vegetation, and precipitation; gives stream flow records and discusses water powers, storage, and power sites; discusses also natural resources and harbors of the Pacific coast, central electric stations, and power utilization, and gives commercial and residential rates. See also 253.

316. Geology and water resources of a portion of south-central Washington, by G. A. Waring. 1913. 46 pp., 1 pl. 5c.

Describes settlements, climate and vegetation, agriculture, grazing, geographic provinces, relation of surface features and structure, and geology; discusses shallow and artesian waters and irrigation enterprises in Sunnyside and Reservation valleys, Horse Heaven Plateau, and the Columbia River Plains, and irrigation along lower Yakima River; gives tabulated data concerning wells and springs.

339. Quality of the surface waters of Washington, by Walton Van Winkle. 1914. 105 pp., 2 pls. 15c.

Discusses briefly the natural and economic features of the State, the constituents and uses of the natural waters, purification of water, methods of analysis, and industrial and geochemical interpretation of the results of analysis; describes the general features of the principal drainage basins and gives the results of an investigation of the character of the river waters; treats briefly of the average chemical composition of river water, the economic value of the rivers, denudation, and the influence of natural features on the character of the waters.

344. Deschutes River, Oregon, and its utilization, by F. F. Henshaw, John H. Lewis, and E. J. McCaustland. 1914. 200 pp., 28 pls. 17 sheets. 50c.

A report prepared in cooperation with the State of Oregon, containing the results of measurements of stream flow, a discussion of the economic distribution of the water, and chapters on the quality of the water, the availability of the water supply, the developed water powers, undeveloped power sites, water rights and appropriations, the relation of the Federal Government to the development of water power, and Government permits for power and reservoir sites.

346. Profile surveys in the basin of Clark Fork of Columbia River, Montana-Idaho-Washington, prepared under the direction of R. B. Marshall, chief geographer. 1914. 6 pp., 3 pls. (22 sheets). 50c.

347. Profile surveys in Snake River basin, Idaho, prepared under the direction of R. B. Marshall, chief geographer. 1914. 12 pp., 3 pls. (37 sheets). 55c.

348. Profile surveys in Hood and Sandy River basins, Oregon, prepared under the direction of R. B. Marshall, chief geographer. 1914. 8 pp., 2 pls. (6 sheets). 30c.

349. Profile surveys in Willamette River basin, Oregon, prepared under the direction of R. B. Marshall, chief geographer. 1914. 8 pp., 3 pls. (16 sheets). 30c.

363. Quality of the surface waters of Oregon, by W. Van Winkle. 1914. 137 pp., 2 pls. 20c.

Describes the topography, drainage, rocks and soils, climate, population, and industries of the State, the constituents of natural waters, water for domestic and industrial uses, and purification of water, methods of analysis, and interpretation of results of analysis; describes the general features of the river basins and the character of the river waters; discusses the conditions influencing the quality of the surface waters, average chemical composition, geochemical character, denudation, industrial value, and value for irrigation.

366. Profile surveys of Snoqualmie, Sultan, and Skykomish rivers, Wash., prepared under the direction of R. B. Marshall, chief geographer. 1914. 7 pp., 3 pls. (12 sheets). 20c.

368. Profile surveys in Wenatchee River basin, Wash., prepared under the direction of R. B. Marshall, chief geographer. 1914. 7 pp., 1 pl. (8 sheets). 20c.

369. Water powers of the Cascade Range, Part III. Yakima River basin, by G. L. Parker and F. B. Storey, 1916. 169 pp., 20 pls.

Describes the geography of the basins, the geologic history, physiography and river history, climate, settlement and development, population, and transportation; gives stream-flow records and discusses natural conditions affecting stream flow, storage reservoirs, developed and undeveloped power sites; treats also of the industrial development of the region, discussing irrigation by gravity systems and by pumping, the production of coal and other minerals, and manufacturing; presents a scheme of development and utilization of stored water. The report was prepared under the direction of the Washington State Board of Geological Survey, and is based on data consisting of "stream-flow records, river plans and profiles, reservoir surveys, and field reconnaissances of the rivers and their various tributaries," obtained by the United States Geological Survey and the United States Reclamation Service, supplemented by a large amount of information furnished by private parties.

370. Surface water supply of Oregon, 1878–1910, by F. F. Henshaw and H. J. Dean. 1915. 829 pp., 1 pl. 45c.

Describes briefly the natural features of Oregon and in greater detail the general features of the river basins; consists principally of records of stream flow that have been carefully studied and recomputed when necessary to insure their best possible interpretation.

376. Profile surveys in Chelan and Methow River basins, Wash., prepared under the direction of R. B. Marshall, chief geographer. 1915. 8 pp., 5 pls. 15c.

377. Profile surveys in Spokane River basin, Wash., and John Day River basin, Oreg., prepared under the direction of R. B. Marshall, chief geographer. 1915. 7 pp., 10 pls. 15c.

378. Profile surveys in 1914 on Middle Fork of Willamette River and White River, Oregon, prepared under the direction of R. B. Marshall, chief geographer. 1915. 8 pp., 6 pls. 15c.

379. Profile surveys in 1914, in Umpqua River basin, Oreg., prepared under the direction of R. B. Marshall, chief geographer. 1915. 7 pp., 13 pls. 20c.

419. Profile surveys in 1915, in Skagit River basin, Wash., prepared under the direction of W. H. Herron, acting chief geographer. 1916. 8 pp., 12 pls. 15c.

420. Profile surveys along Henrys Fork, Idaho, and Logan River and Blacksmith Fork, Utah, prepared under the direction of W. H. Herron, acting chief geographer. 1916. 8 pp., 10 pls. 10c.

BULLETINS.

An asterisk (*) indicates that the Geological Survey's stock of the paper is exhausted. Many of the papers so marked may be purchased from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C. Bulletins are of octavo size.

*199. Geology and water resources of the Snake River Plains of Idaho, by I. C. Russell. 1902. 192 pp., 25 pls. 25c.

Describes the topography, geology, climate, vegetation, fauna, and soils of an area extending entirely across the southern part of Idaho; discusses streams, springs, water powers, irrigation and agriculture, industries, routes of transportation and highways; treats of the origin of surface and subsurface waters, the requisite conditions for artesian wells and the quantity of water available.

252. Preliminary report on the geology and water resources of central Oregon, by I. C. Russell. 1905. 138 pp., 24 pls. 15c.

Describes a portion of the extreme northern part of the Great Basin and a part of the drainage area of Deschutes River and its principal tributary, Crooked River; gives an account of the topography, drainage, rainfall and temperature, winds, and forests; describes the volcanic sedimentary rock formations, and discusses by counties the geology and topography, the surface and underground waters; treats of artesian conditions in the Deschutes basin and makes suggestions concerning artesian-well records.

*298. Record of deep-well drilling for 1905, by M. L. Fuller and Samuel Sanford. 1906. 299 pp. 25c.

Gives an account of progress in the collection of well records and samples; contains tabulated records of wells in Idaho, Montana, Nevada, Oregon, Washington, and Wyoming, and detailed records of wells in Benton, Jefferson, and Walla Walla counties, Wash. The wells of which detailed sections are given were selected because they afford valuable stratigraphic information.

ANNUAL REPORTS.

Each of the papers contained in the annual reports was also issued in separate form.

Annual reports are distributed free by the Geological Survey as long as its stock lasts. An asterisk (*) indicates that this stock has been exhausted. Many of the papers so marked, however, may be purchased from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C.

*Tenth Annual Report of the Director of the United States Geological Survey, 1888–89, J. W. Powell, Director. 1890. 2 parts. *Pt. II. Irrigation, viii, 123 pp. 35c.

Makes a preliminary report on the organization and prosecution of the survey of the arid lands for purposes of irrigation; includes an account of the methods of topographic and hydraulic work, the segregation work on reservoir sites and irrigable lands, field and office methods and brief descriptions of the topography of some of the river basins.

Eleventh Annual Report of the United States Geological Survey, 1889–90, J. W. Powell, Director. 1891. 2 parts. Pt. II. Irrigation, xiv, 395 pp. 30 plates and maps. $1.25. Contains:

*Hydrography, pp. 1–110. Discusses scope of work, methods of stream measurement, rainfall and evaporation, and describes the more important streams.

*Engineering, pp. 111–200. Defines the scope of the work and gives an account of the survey in the Sun River basin and in the Arkansas, Rio Grande, California, Lahontan, Utah, and Snake River divisions.

*Topography, pp. 291–343. Comprises reports of the topographic surveys in California Nevada, Colorado, Idaho, Montana, and New Mexico, and a report on reservoir sites.

*Irrigation literature, pp. 345–388. Gives a list of books and pamphlets on irrigation and allied subjects, mainly contained in the library of the United States Geological Survey.

Twelfth Annual Report of the Director of the United States Geological Survey, 1890–91, J. W. Powell, Director. 1891. 2 parts. Pt. II. Irrigation, xviii, 576 pp., 93 pls. $2. Contains:

*Hydrography of the arid regions, by F. H. Newell, pp. 213–361, Pls. 58–106. Discusses the available water supply of the arid regions, the duty of water, flood waters, relation of rainfall to river flow; classifies the drainage basins; and describes the rivers of the Missouri, Arkansas, Rio Grande, Colorado, Sacramento, and San Joaquin basins, and the principal streams of the Great Basin in Nevada and Utah and the Snake River basin.

Thirteenth Annual Report of the United States Geological Survey, 1891–92, J. W. Powell, Director. 1892. (Pts. II and III, 1893.) 3 parts. *Pt. III, Irrigation, xi, 486 pp., 77 pls. $1.85. Contains:

*Engineering results of irrigation survey, by H. N. Wilson, pp. 351–437, Pls. 147–182. Describes structures on the Pocatello Canal, Idaho.

Sixteenth Annual Report of the United States Geological Survey, 1894–95, Charles D. Walcott, Director. 1896. (Pts. II, III, and IV, 1895.) 4 parts. *Pt. II. Papers of an economic character, xix, 598 pp., 43 pls. $1.25. Contains:

The public lands and their water supply, by F. H. Newell, pp. 457–533, Pls. 35–39. Describes general character of the public lands, the lands disposed of (railroad, grant, and swamp lands, and private miscellaneous entries), lands reserved (Indian, forest, and military reservations), the vacant lands, and the rate of disposal of vacant lands; discusses the streams, wells and reservoirs as sources of water supply; gives details for each State.

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Nineteenth Annual Report of the United States Geological Survey, 1897–98, Charles D. Walcott, Director. 1898. (Parts II, III, and V, 1899.) 6 parts in 7 vols. and separate case for maps with Pt. V. *Pt. V, Forest reserves, xvii, 400 pp., 110 pls. $1.25. 16 maps in separate case, 75c. Contains:

*Priest River Forest Reserve, by J. B. Leiberg, pp. 217–252, Pls. 46–61.
*Bitterroot Forest Reserve, by J. B. Leiberg, pp. 253–282, Pls. 62–73.
*Washington Forest Reserve, by H. B. Ayres, pp. 283–313, Pls. 74–100.
*Eastern part of Washington Forest Reserve, by M. W. Gorman, pp. 315–349, Pl. 101.
*Forest conditions of northern Idaho, by J. B. Leiberg, pp. 373–386, Pls. 109–110.
These reports describe the topography and the streams of the forest reserves.

Twentieth Annual Report of the United States Geological Survey, 1898–99, Charles D. Walcott, Director. 1899. (Parts II, III, IV, V, and VII, 1900.) 7 parts in 8 vols. and separate case for maps with Pt. V. *Pt. V, Forest reserves, xix, 498 pp., 159 pls., 8 maps in separate case. $2.80. Contains:

*The Flathead Forest Reserve, by H. B. Ayres, pp. 245–316, Pls. 76–113.
*Bitterroot Forest Reserve, by J. B. Leiberg, pp. 317–409, Pls. 114–142. Contains brief descriptions of the streams and lakes in the reserves; states that the water is too poor for use for irrigation.

Twenty-first Annual Report of the United States Geological Survey, 1899–1900, Charles D. Walcott, Director. 1900. (Parts III, IV, VI, VI continued, and VII, 1901.) 7 parts in 8 vols. and separate case for maps with Pt. V. *Pt. V, Forest reserves, 711 pp., 143 pls., 39 maps in separate case. $3.85. Contains:

*Mount Rainier Forest Reserve, Washington, by F. G. Plummer, pp. 81–143, Pls. 33–50.
*Olympic Forest Reserve, Washington, from field notes by Arthur Dodwell and T. F. Rixon, pp. 145–208, Pls. 51–70.
*Cascade Range Forest Reserve, Oregon, from T. 28 S. to T. 37 S., inclusive, together with the Ashland Forest Reserve and adjacent forest regions from T. 28 S. to T. 41 S., inclusive, and from R. 2 W. to R. 14 E., Willamette meridian, inclusive, by J. B. Leiberg, pp. 209–498, Pls. 81–84. Contains descriptions of many of the streams flowing through the forest reserves.

GEOLOGIC FOLIOS.

Under the plan adopted for the preparation of a geologic map of the United States the entire area is divided into small quadrangles, bounded by certain meridians and parallels, and these quadrangles, which number several thousand, are separately surveyed and mapped.[1] The unit of survey is also the unit of publication, and the maps and description of each quadrangle are issued in the form of a folio. When all the folios are completed they will constitute the Geologic Atlas of the United States.

A folio is designated by the name of the principal town or of a prominent natural feature within the quadrangle. Each folio includes maps showing the topography, geology, underground structure, and mineral deposits of the area mapped and several pages of descriptive text. The text explains the maps and describes the topographic and geologic features of the country and its mineral products. The topographic map shows roads, railroads, waterways, and, by contour lines, the shapes of the hills and valleys and the height above sea level of all points in the quadrangle. The areal-geology map shows the distribution of the various rocks at the surface. The structural-geology map shows the relations of the rocks to one another underground. The economic-geology map indicates the location of mineral deposits that are commercially valuable. The artesian-water map shows the depth to underground-water horizons. Economic-geology and artesian-water maps are included in folios if the conditions in the areas mapped warrant their publication. The folios are of special interest to

[1] Index maps showing areas in the North Pacific slope basins covered by topographic maps and by geologic folios will be mailed on receipt of request addressed to the Director, U. S. Geological Survey, Washington, D. C.

students of geography and geology and are valuable as guides in the development and utilization of mineral resources.

The folios numbered from 1 to 163, inclusive, are published in only one form (18 by 22 inches), called the library edition. Some of the folios that bear numbers higher than 163 are published also in an octavo edition (6 by 9 inches). Owing to a fire in the Geological Survey Building May 18, 1913, the stock of geologic folios was more or less damaged by fire and water, but 80 or 90 per cent of the folios are usable. They will be sold at the uniform price of 5 cents each, with no reduction for wholesale orders. This rate applies to folios in stock from 1 to 184, inclusive (except reprints), also the library edition of folio 186. The library edition of folios 185, 187, and higher numbers sells for 25 cents a copy, except that some folios which contain an unusually large amount of matter sell at higher prices. The octavo edition of folio 185 and higher numbers sells for 50 cents a copy except folio 193, which sells for 75 cents a copy. If 34 folios selling at 25 cents each (or their equivalent in higher-priced folios) are ordered at one time a discount of 40 per cent is allowed; $5.10 is the minimum amount accepted at this rate.

All the folios contain descriptions of the drainage of the quadrangles. The folios in the following list contain also brief discussions of the underground waters in connection with the economic resources of the areas and more or less information concerning the utilization of the water resources.

An asterisk (*) indicates that the stock of the folio is exhausted.

*45. Boise, Idaho. 5c.

Describes geography and geology, cold springs and cold artesian waters, and hot springs and hot artesian waters.

103. Nampa, Idaho-Oregon. 5c.

Describes the relief, drainage, climate, and vegetation of the area; discusses the geologic history and geologic formations, and, under "Economic geology," the surface waters available for irrigation, the springs and shallow wells, and the artesian wells; indicates areas of possible artesian flow.

104. Silver City, Idaho. 5c.

Describes the relief, drainage, climate, vegetation, and culture of the Silver City quadrangle discusses the geologic history and the geologic formations, and, under "Economic geology," the surface waters available for irrigation or water-power development, warm springs, and artesian wells; notes possible chances for artesian waters; gives records of wells near Enterprise and Guffey; see also Water-Supply Paper 78.

*139. Snoqualmie, Washington. 5c.

Describes the relief and drainage of an area including portions of Kittitas, Yakima, Pierce, and King counties; the stratigraphic, structural, and historical geology, and, under "Economic geology," includes a brief paragraph on the utilization of the water supply.

MISCELLANEOUS REPORTS.

Other Federal bureaus and State and other organizations have from time to time published reports relating to the water resources of various sections of the country. Notable among those pertaining to the northern Pacific coast drainage basins are the reports of the commissioner of conservation [State of Montana]; the State land commission; the State engineer of Idaho; the Bureau of Industry, Agriculture, and Irrigation of Nevada; the State engineers of Nevada, Oregon, Utah, and Washington; the annual reports of the United States Reclamation Service; and the reports of the Chief

of Engineers, U. S. Army. The following reports deserve special mention:

The Oregon system of water titles, by John H. Lewis: Oregon State Engineer Bull. 2, 1912.

State and National water laws, with a detailed statement of the Oregon system of water titles, by John H. Lewis, with a discussion by Clarence T. Johnston and L. J. Le Conte: Am. Soc. Civil Eng. Trans., vol. 76, pp. 637–758, 1913.

Report of the commission on conservation [State of Montana] on bills relating to public lands, water rights, and the protection and preservation of the forests: Helena, 1911; also report of the governor of the State of Montana on the same subject.

How to appropriate the public waters of the State of Nevada, compiled by W. M. Kearney, State engineer, 1911.

Requirements and regulations, including suggestions and instructions in relation to the appropriation, use, and measurement of water in the State of Nevada: State engineer of Nevada, 1912.

Irrigation pumping in Nevada, etc., by Charles Norcross: Nevada Bur. of Industry, Agr., and Irr. Bull. 8, 1913.

The water resources of Washington: Potable and mineral water, by H. G. Byers; artesian water, by C. A. Ruddy; water power, by R. E. Heine: Washington, Geol. Survey Ann. Rept. for 1901, vol. 1, pt. 5, 1902.

Preliminary report on the Quincy Valley irrigation project, by Henry Landes and others: Washington, Geol. Survey Bull. 14, 1912.

Biennial Report of the State Commission of Arid Lands [Washington], 1895–96 and 1897–98.

The irrigated lands of the State of Washington, by George M. Allen, deputy commissioner: State Bureau of Statistics and Immigration, 1910.

Irrigation laws of the State of Wyoming, prepared for publication in the office of the State engineer, 1909.

GEOLOGICAL SURVEY HYDROLOGIC REPORTS OF GENERAL INTEREST.

The following list comprises reports not readily classifiable by drainage basins and covering a wide range of hydrologic investigations:

WATER-SUPPLY PAPERS.

*1. Pumping water for irrigation, by H. M. Wilson. 1896. 57 pp., 9 pls.

Describes pumps and motive powers, windmills, water wheels, and various kinds of engines; also storage reservoirs to retain pumped water until needed for irrigation.

*3. Sewage irrigation, by G. W. Rafter. 1897. 100 pp., 4 pls. (See Water-Supply Paper 22.) 10c.

Discusses methods of sewage disposal by intermittent filtration and by irrigation; describes utilization of sewage in Germany, England, and France, and sewage purification in the United States.

*8. Windmills for irrigation, by E. C. Murphy. 1897. 49 pp., 8 pls. 10c.

Gives results of experimental tests of windmills during the summer of 1896 in the vicinity of Garden, Kans.; describes instruments and methods and draws conclusions.

*14. New tests of certain pumps and water lifts used in irrigation, by O. P. Hood, 1898. 91 pp., 1 pl. 10c.

Discusses efficiency of pumps and water lifts of various types.

*20. Experiments with windmills, by T. O. Perry. 1899. 97 pp., 12 pls. 15c.

Includes tables and descriptions of wind wheels, makes comparisons of wheels of several types, and discusses results.

*22. Sewage irrigation, Part II, by G. W. Rafter. 1899. 100 pp., 7 pls. 15c.

Gives résumé of Water-Supply Paper No. 3; discusses pollution of certain streams, experiments on purification of factory wastes in Massachusetts, value of commercial fertilizers, and describes American sewage-disposal plants by States; contains bibliography of publications relating to sewage utilization and disposal.

*41. The windmill; its efficiency and economic use, Part I, by E. C. Murphy. 1901. 72 pp., 14 pls.

*42. The windmill; its efficiency and economic use, Part II, by E. C. Murphy. 1901. 75 pp., 2 pls. 10c.

Nos. 41 and 42 give details of results of experimental tests with windmills of various types.

*43. Conveyance of water in irrigation canals, flumes, and pipes, by Samuel Fortier. 1901. 86 pp., 15 pls. 15c.

*56. Methods of stream measurement. 1901. 51 pp., 12 pls. 15c.

Describes the methods used by the Survey in 1901–2. See also Nos. 64, 94, and 95.

64. Accuracy of stream measurements, by E. C. Murphy. 1902. 99 pp., 4 pls. (See No. 95.) 10c.

Describes methods of measuring velocity of water and of measuring and computing stream flow and compares results obtained with the different instruments and methods; describes also experiments and results at the Cornell University hydraulic laboratory. A second, enlarged, edition published as Water-Supply Paper 95.

*67. The motions of underground waters, by C. S. Slichter. 1902. 106 pp., 8 pls. 15c.

Discusses origin, depth, and amount of underground waters; permeability of rocks and porosity of soils; causes, rates, and laws of motions of underground water; surface and deep zones of flow, and recovery of waters by open wells and artesian and deep wells; treats of the shape and position of the water table; gives simple methods of measuring yield of flowing well; describes artesian wells at Savannah, Ga.

72. Sewage pollution in the metropolitan area near New York City and its effect on inland water resources, by M. O. Leighton. 1902. 75 pp., 8 pls. 10c.

Defines "normal" and "polluted" waters and discusses the damage resulting from pollution.

*80. The relation of rainfall to run-off, by G. W. Rafter. 1903. 104 pp. 10c.

Treats of measurements of rainfall and laws and measurements of stream flow; gives rainfall, run-off, and evaporation formulas; discusses effect of forests on rainfall and run-off.

87. Irrigation in India (second edition), by H. M. Wilson. 1903. 238 pp., 27 pls. 25c.

First edition was published in Part II of the Twelfth Annual Report.

93. Proceedings of first conference of engineers of the Reclamation Service, with accompanying papers, compiled by F. H. Newell, chief engineer. 1904. 361 pp. 25c.

Contains, in addition to an account of the organization of the hydrographic [water-resources] branch of the United States Geological Survey, and the reports of the conference, the following papers of more or less general interest:

Limits of an irrigation project, by D. W. Ross.
Relation of Federal and State laws to irrigation, by Morris Bien.
Electrical transmission of power for pumping, by H. A. Storrs.
Correct design and stability of high masonry dams, by Geo. Y. Wisner.
Irrigation surveys and the use of the plane table, by J. B. Lippincott.
The use of alkaline waters for irrigation, by Thomas A. Means.

*94. Hydrographic manual of the United States Geological Survey, prepared by E. C. Murphy, J. C. Hoyt, and G. B. Hollister. 1904. 76 pp., 3 pls. 10c.

Gives instruction for field and office work relating to measurements of stream flow by current meters. See also No. 95.

*95. Accuracy of stream measurements (second, enlarged edition), by E. C. Murphy. 1904. 169 pp., 6 pls.

Describes methods of measuring and computing stream flow and compares results derived from different instruments and methods. See also No. 94.

103. A review of the laws forbidding pollution of inland waters in the United States, by E. B. Goodell. 1904. 120 pp. (See No. 152.)

Explains the legal principles under which antipollution statutes become operative, quotes court decisions to show authority for various deductions, and classifies according to scope the statutes enacted in the different States.

110. Contributions to the hydrology of eastern United States, 1904; M. L. Fuller, geologist in charge. 1905. 211 pp., 5 pls. 10c.

Contains the following reports of general interest. The scope of each paper is indicated by its title.

Description of underflow meter used in measuring the velocity and direction of underground water, by Charles S. Slichter.

The California or "stovepipe" method of well construction, by Charles S. Slichter.

Approximate methods of measuring the yield of flowing wells, by Charles S. Slichter.

Corrections necessary in accurate determinations of flow from vertical well casings, from notes furnished by A. N. Talbot.

Experiment relating to problems of well contamination at Quitman, Ga., by S. W. McCallie.

Notes on the hydrology of Cuba, by M. L. Fuller.

113. The disposal of strawboard and oil-well wastes, by R. L. Sackett and Isaiah Bowman. 1905. 52 pp., 4 pls. 5c.

The first paper discusses the pollution of streams by sewage and by trade wastes, describes the manufacture of strawboard and gives results of various experiments in disposing of the waste. The second paper describes briefly the topography, drainage, and geology of the region about Marion, Ind., the contamination of rock wells and of streams by waste oil and brine.

114. Underground waters of eastern United States; M. L. Fuller, geologist in charge. 1905. 285 pp., 18 pls. 25c.

Contains report on "Occurrence of underground waters," by M. L. Fuller, discussing sources, amount, and temperature of waters, permeability and storage capacity of rocks, water-bearing formations, recovery of water by springs, wells, and pumps, essential conditions of artesian flows, and general conditions affecting underground waters in eastern United States.

119. Index to the hydrographic progress reports of the United States Geological Survey, 1888 to 1903, by J. C. Hoyt and B. D. Wood. 1905. 253 pp. 15c.

Scope indicated by title.

120. Bibliographic review and index of papers relating to underground waters published by the United States Geological Survey, 1879–1904, by M. L. Fuller. 1905. 128 pp. 10c.

Scope indicated by title.

*122. Relation of the law to underground waters, by D. W. Johnson. 1905. 55 pp. 5c.

Defines and classifies underground waters, gives common-law rules relating to their use, and cites State legislative acts affecting them.

140. Field measurements of the rate of movement of underground waters, by C. S. Slichter. 1905. 122 pp., 15 pls. 15c.

Discusses the capacity of sand to transmit water, describes measurements of underflow in Rio Hondo, San Gabriel, and Mohave River valleys, Cal., and on Long Island, N. Y.; gives results of tests of wells and pumping plants, and describes stovepipe method of well construction.

143. Experiments on steel-concrete pipes on a working scale, by J. H. Quinton. 1905. 61 pp., 4 pls.

Scope indicated by title.

145. Contributions to the hydrology of eastern United States, 1905; M. L. Fuller, geologist in charge. 1905. 220 pp., 6 pls. 10c.

Contains brief reports of general interest as follows:

Drainage of ponds into drilled wells, by Robert E. Horton. Discusses efficiency, cost, and capacity of drainage wells, and gives statistics of such wells in southern Michigan.

Construction of so-called fountain and geyser springs, by Myron L. Fuller.

A convenient gage for determining low artesian heads, by Myron L. Fuller.

146. Proceedings of second conference of engineers of the Reclamation Service, with accompanying papers, compiled by F. H. Newell, chief engineer. 1905. 267 pp. 15c.

Contains brief account of the organization of the hydrographic [water-resources] branch and the Reclamation Service, reports of conferences and committees, circulars of instruction, and many brief reports on subjects closely related to reclamation, and a bibliography of technical papers by member sof the service. Of the papers read at the conference those listed below (scope indicated by title) are of more or less general interest:

Proposed State code of water laws, by Morris Bien.
Power engineering applied to irrigation problems, by O. H. Ensign.
Estimates on tunneling in irrigation projects, by A.L. Fellows.
Collection of steam-gaging data, by N. C. Grover.
Diamond-drill methods, by G. A. Hammond.
Mean-velocity and area curves, by F. W. Hanna.
Importance of general hydrographic data concerning basins of streams gaged, by R. E. Horton.
Effect of aquatic vegetation on stream flow, by R. E. Horton.
Sanitary regulations governing construction camps, by M. O. Leighton.
Necessity of draining irrigated land, by Thos. H. Means.
Alkali soils, by Thos. H. Means.
Cost of stream-gaging work, by E. C. Murphy.
Equipment of a cable gaging station, by E. C. Murphy.
Silting of reservoirs, by W. M. Reed.
Farm-unit classification, by D. W. Ross.
Cost of power for pumping irrigating water, by H. A. Storrs.
Records of flow at current-meter gaging stations during the frozen season, by F. H. Tillinghast.

147. Destructive floods in the United States in 1904, by E. C. Murphy and others. 1905. 206 pp., 18 pls. 15c.

Contains a brief account of "A method of computing cross-section area of waterways," including formulas for maximum discharge and areas of cross section.

150. Weir experiments, coefficients, and formulas, by R. E. Horton. 1906. 189 pp., 38 pls. (See Water-Supply Paper 200.) 15c.

Scope indicated by title.

*151. Field assay of water, by M. O. Leighton. 1905. 77 pp., 4 pls. 10c.

Discusses methods, instruments, and reagents used in determining turbidity, color, iron, chlorides, and hardness in connection with the studies of the quality of water in various parts of the United States.

152. A review of the laws forbidding pollution of inland waters in the United States (second edition), by E. B. Goodell. 1905. 149 pp. 10c.

Scope indicated by title.

*160. Underground-water papers, 1906; M. L. Fuller, geologist in charge. 1906. 104 pp., 1 pl.

Gives account of work in 1905; lists of publications relating to underground waters, and contains the following brief reports of general interest:
Significance of the term "artesian," by Myron L. Fuller.
Representation of wells and springs on maps, by Myron L. Fuller.
Total amount of free water in the earth's crust, by Myron L. Fuller.
Use of fluorescein in the study of underground waters, by R. B. Dole.
Problems of water contamination, by Isaiah Bowman.
Instances of improvement of water in wells, by Myron L. Fuller.

*162. Destructive floods in the United States in 1905, with a discussion of flood discharge and frequency and an index to flood literature, by E. C. Murphy and others. 1906. 105 pp., 4 pls. 15c.

*163. Bibliographic review and index of underground-water literature published in the United States in 1905, by M. L. Fuller, F. G. Clapp, and B. L. Johnson. 1906. 130 pp. 15c.

Scope indicated by title.

*179. Prevention of stream pollution by distillery refuse, based on investigations at Lynchburg, Ohio, by Herman Stabler. 1906. 34 pp., 1 pl. 10c.

Describes grain distillation, treatment of slop, sources, character, and effects of effluents on streams; discusses filtration, precipitation, fermentation, and evaporation methods of disposal of wastes without pollution.

*180. Turbine water-wheel tests and power tables, by R. E. Horton. 1906. 134 pp., 2 pls. 20c.

Scope indicated by title.

*185. Investigations on the purification of Boston sewage, by C.-E. A. Winslow and E. B. Phelps. 1906. 163 pp. 25c.

Discusses composition, disposal, purification, and treatment of sewages and recent tendencies in sewage-disposal practice in England, Germany, and the United States; describes character of crude sewage at Boston, removal of suspended matter, treatment in septic tanks, and purification in intermittent sand filtration and coarse material; gives bibliography.

*186. Stream pollution by acid-iron wastes, a report based on investigations made at Shelby, Ohio, by Herman Stabler. 1906. 36 pp., 1 pl.

Gives history of pollution by acid-iron wastes at Shelby, Ohio, and resulting litigation; discusses effect of acid-iron liquors on sewage purification processes, recovery of copperas from acid-iron wastes, and other processes for removal of pickling liquor.

*187. Determination of stream flow during the frozen season, by H. K. Barrows and R. E. Horton. 1907. 93 pp., 1 pl. 15c.

Scope indicated by title.

*189. The prevention of stream pollution by strawboard waste, by E. B. Phelps. 1906. 29 pp., 2 pls. 5c.

Describes manufacture of strawboard, present and proposed methods of disposal of waste liquors, laboratory investigations of precipitation and sedimentation, and field studies of amount and character of water used, raw material and finished product, and mechanical filtration.

*194. Pollution of Illinois and Mississippi rivers by Chicago sewage (a digest of the testimony taken in the case of the State of Missouri *v.* the State of Illinois and the Sanitary district of Chicago), by M. O. Leighton. 1907. 369 pp., 2 pls. 40c.

Scope indicated by amplification of title.

*200. Weir experiments, coefficients, and formulas (revision of paper No. 150), by R. E. Horton. 1907. 195 pp., 38 pls. 35c.

Scope indicated by title.

*226. The pollution of streams by sulphite-pulp waste, a study of possible remedies, by E. B. Phelps. 1909. 37 pp., 1 pl. 10c.

Describes manufacture of sulphite pulp, the waste liquors, and the experimental work leading to suggestions as to methods of preventing stream pollution.

*229. The disinfection of sewage and sewage filter effluents, with a chapter on the putrescibility and stability of sewage effluents, by E. B. Phelps. 1909. 91 pp., 1 pl. 15c.

Scope indicated by title.

*234. Papers on the conservation of water resources. 1909. 96 pp., 2 pls. 15c.

Contains the following papers, whose scope is indicated by their titles: Distribution of rainfall by Henry Gannett; Floods, by M. O. Leighton; Developed water powers, compiled under the direction of W. M. Steuart, with discussion by M. O. Leighton; Undeveloped water powers, by M. O. Leighton; Irrigation, by F. H. Newell; Underground waters, by W. C. Mendenhall; Denudation, by R. B. Dole and Herman Stabler; Control of catchment areas, by H. N. Parker.

*235. The purification of some textile and other factory wastes, by Herman Stabler and G. H. Pratt. 1909. 76 pp. 10c.

Discusses waste waters from wool scouring, bleaching and dyeing cotton yarn, bleaching cotton piece goods, and manufacture of oleomargarine, fertilizer, and glue.

236. The quality of surface waters in the United States: Part I. Analyses of waters east of the one hundredth meridian, by R. B. Dole. 1909. 123 pp. 10c.

Describes collection of samples, methods of examination, preparation of solutions, accuracy of estimates, and expression of analytical results.

238. The public utility of water powers and their governmental regulation, by René Tavernier and M. O. Leighton. 1910. 161 pp. 15c.

Discusses hydraulic power and irrigation, French, Italian, and Swiss legislation relative to the development of water powers, and laws proposed in the French Parliament; reviews work of bureau of hydraulics and agricultural improvement of the French department of agriculture, and gives résumé of Federal and State water-power legislation in the United States.

*255. Underground waters for farm use, by M. L. Fuller. 1910. 58 pp., 17 pls. 15c.

Discusses rocks as sources of water supply and the relative safety of supplies from different materials; springs and their protection; open or dug and deep wells, their location, yield, relative cost, protection, and safety; advantages and disadvantages of cisterns and combination wells and cisterns.

*257. Well-drilling methods, by Isaiah Bowman. 1911. 139 pp., 4 pls. 15c.

Discusses amount, distribution, and disposal of rainfall, water-bearing rocks, amount of underground water, artesian conditions, and oil and gas bearing formations; gives history of well drilling in Asia, Europe, and the United States; describes in detail the various methods and the machinery used; discusses loss of tools and geologic difficulties; contamination of well waters and methods of prevention; tests of capacity and measurement of depth; and costs of sinking wells.

*258. Underground-water papers, 1910, by M. L. Fuller, F. G. Clapp, G. C. Matson, Samuel Sanford, and H. C. Wolff. 1911. 123 pp., 2 pls. 15c.

Contains the following papers (scope indicated by titles) of general interest:
Drainage by wells, by M. L. Fuller.
Freezing of wells and related phenomena, by M. L. Fuller.
Pollution of underground waters in limestone, by G. C. Matson.
Protection of shallow wells in sandy deposits, by M. L. Fuller.
Magnetic wells by M. L. Fuller.

259. The underground waters of southwestern Ohio, by M. L. Fuller and F. G. Clapp, with a discussion of the chemical character of the waters, by R. B. Dole. 1912. 228 pp., 9 pls. 35c.

Describes the topography, climate, and geology of the region, the water-bearing formations, the source, mode of occurrence, and head of the waters, and municipal supplies; gives details by counties; discusses in supplement, under chemical character, method of analysis and expression of results, mineral constituents, effect of the constituents on waters for domestic, industrial, or medicinal uses, methods of purification, chemical composition; many analyses and field assays. The matter in the supplement was also published in Water-Supply Paper 254 (The underground waters of north-central Indiana).

280. Gaging stations maintained by the United States Geological Survey, 1888–1910 and Survey publications relating to water resources, compiled by B. D. Wood. 1912. 102 pp. 10c.

*315. The purification of public water supplies, by G. A. Johnson. 1913. 84 pp., 8 pls. 10c.

Discusses ground, lake, and river waters as public supplies, development of waterworks systems in the United States, water consumption, and typhoid fever; describes methods of filtration and sterilization of water and municipal water softening.

334. The Ohio Valley flood of March–April, 1913 (including comparisons with some earlier floods), by A. H. Horton and H. J. Jackson. 1913. 96 pp., 22 pls. 20c.

Although relating specifically to floods in the Ohio Valley, this report discusses also the causes of floods and the prevention of damage by floods.

337. The effects of ice on stream flow, by William Glenn Hoyt. 1913. 77 pp., 7 pls. 15c.

Discusses methods of measuring the winter flow of streams.

*345. Contributions to the hydrology of the United States, 1914. N. C. Grover, chief hydraulic engineer. 1915. 225 pp., 17 pls. 30c. Contains:

(*e*) A method of determining the daily discharge of rivers of variable slope, by M. R. Hall, W. E. Hall, and C. H. Pierce, pp. 53–65.

364. Water analyses from the laboratory of the United States Geological Survey, tabulated by F. W. Clarke, chief chemist. 1914. 40 pp. 5c.

Contains analyses of waters from rivers, lakes, wells, and springs in various parts of the United States, including analyses of the geyser water of Yellowstone National Park, hot springs in Montana, brines from Death Valley, water from the Gulf of Mexico, and mine waters from Tennessee, Michigan, Missouri and Oklahoma, Montana, Colorado and Utah, Nevada and Arizona, and California.

371. Equipment for current-meter gaging stations, by G. J. Lyon. 1915. 64 pp., 37 pls. 20c.

Describes methods of installing automatic and other gages and of constructing gage wells, shelters, and structures for making discharge measurements and artificial controls.

*375. Contributions to the hydrology of the United States, 1915. N. C. Grover, chief hydraulic engineer. 1916. 181 pp., 9 pls.

(*c*) The relation of stream gaging to the science of hydraulics, by C. H. Pierce and R. W. Davenport, pp. 77–84.

(*e*) A method of correcting river discharge for a changing stage, by B. E. Jones, pp. 117–130.

(*f*) Conditions requiring the use of automatic gages in obtaining records of stream flow, by C. H. Pierce, pp. 131–139.

Three papers presented at the conference of engineers of the water-resources branch in December, 1914.

400. Contributions to the hydrology of the United States, 1916. N. C. Grover, chief hydraulic engineer.

(a) The people's interest in water-power resources, by G. O. Smith, pp. 1–8.
(c) The measurement of silt-laden streams, by Raymond C. Pierce, pp. 39–51.
(d) Accuracy of stream-flow data, by N. C. Grover and J. C. Hoyt, pp. 53–59.

ANNUAL REPORTS.

*Fifth Annual Report of the United States Geological Survey, 1883–84, J. W. Powell, Director. 1885. xxxvi, 469 pp., 58 pls. $2.25. Contains:

*The requisite and qualifying conditions of artesian wells, by T. C. Chamberlin, pp. 125–173, Pl. 21. Scope indicated by title.

Twelfth Annual Report of the United States Geological Survey, 1890–91, J. W. Powell, Director. 1891. 2 parts. Pt. II, Irrigation, xviii, 576 pp., 93 pls. $2. Contains:

*Irrigation in India, by H. M. Wilson, pp. 363–561, Pls. 107 to 146. See Water-Supply Paper 87.

Thirteenth Annual Report of the United States Geological Survey, 1891–92, J. W. Powell, Director. 1892. (Pts. II and III, 1893.) 3 parts. *Pt. III, Irrigation, xi, 486 pp., 77 pls. $1.85. Contains:

*American irrigation engineering, by H. M. Wilson, pp. 101–349, Pls. 111 to 146. Discusses the economical aspects of irrigation, alkaline drainage, silt, and sedimentation; gives brief history of legislation; describes perennial canals in Idaho-California, Wyoming, and Arizona; discusses water storage at reservoirs of the California and other projects, subsurface sources of supply, pumping and subirrigation.

Fourteenth Annual Report of the United States Geological Survey, 1892–93, J. W. Powell, Director. 1893. (Pt. II, 1894.) 2 parts. *Pt. II, Accompanying papers, xx, 597 pp., 73 pls. $2.10. Contains:

*The potable waters of eastern United States, by W J McGee, pp. 1–47. Discusses cistern water, stream waters, and ground waters, including mineral springs and artesian wells.

*Natural mineral waters of the United States, by A. C. Peale, pp. 49–88, Pls. 3 and 4. Discusses the origin and flow of mineral springs, the source of mineralization, thermal springs, the chemical composition and analysis of spring waters, geographic distribution, and the utilization of mineral waters; gives a list of American mineral spring resorts; contains also some analyses.

Nineteenth Annual Report of the United States Geological Survey, 1897–98, Charles D. Walcott, Director. 1898. (Parts II, III, and V, 1899.) 6 parts in 7 vols. and separate case for maps with Pt. V. *Pt. II, Papers chiefly of a theoretic nature, v, 958 pp., 172 pls. $2.65. Contains:

*Principles and conditions of the movements of ground water, by F. H. King, pp. 59–294, Pls. 6 to 16. Discusses the amount of waters stored in sandstone, in soil, and in other rocks, and the depth to which ground water penetrates; gravitational, thermal, and capillary movements of ground waters, and the configuration of the ground-water surface; gives the results of experimental investigations on the flow of air and water through a rigid, porous media, and through sand, sandstones, and silts; discusses results obtained by other investigators, and summarizes results of observations; discusses also rate of flow of water through sand and rock, the growth of rivers, rate of filtration through soil, interference of wells, etc.

*Theoretical investigation of the motion of ground waters, by C. S. Slichter, pp. 295–384, Pl. 17. Scope indicated by title.

PROFESSIONAL PAPERS.

*72. Denudation and erosion in the southern Appalachian region and the Monongahela basin, by L. C. Glenn. 1911. 137 pp., 21 pls. 35c.

Describes the topography, geology, drainage, forests, climate and population, and transportation facilities of the region, the relation of agriculture, lumbering, mining, and power development to erosion and denudation, and the nature, effects, and remedies of erosion; gives details of conditions in Holston, Nolichucky, French Broad, Little Tennessee, and Hiwassee River basins, along Tennessee River proper, and in the basins of the Coosa-Alabama system, Chattahoochee, Savannah, Saluda, Broad, Catawba, Yadkin, New, and Monongahela rivers.

86. The transportation of débris by running water, by G. K. Gilbert, based on experiments made with the assistance of E. C. Murphy. 1914. 263 pp., 3 pls. 70c.

The results of an investigation which was carried on in a specially equipped laboratory at Berkeley, Cal., and was undertaken for the purpose of learning "the laws which control the movement of bed load and especially to determine how the quantity of load is related to the stream slope and discharge and to the degree of comminution of the débris."

A highly technical report.

BULLETINS.

*32. Lists and analyses of the mineral springs of the United States (a preliminary study), by A. C. Peale. 1886. 235 pp.

Defines mineral waters, lists the springs by States, and gives tables of analyses so far as available.

*264. Record of deep-well drilling for 1904, by M. L. Fuller, E. F. Lines, and A. C. Veatch. 1905. 106 pp. 10c.

*298. Record of deep-well drilling for 1905, by M. L. Fuller and Samuel Sanford. 1906. 299 pp. 25c.

Bulletins 264 and 298 discuss the importance of accurate well records to the driller, to owners of oil, gas, and water wells, and to the geologist; describe the general methods of work; give tabulated records of wells by States, and detailed records selected as affording valuable stratigraphic information.

*319. Summary of the controlling factors of artesian flows, by Myron L. Fuller, 1908. 10c.

Describes underground reservoirs, the sources of underground waters, the confining agents, the primary and modifying factors of artesian circulation, the essential and modifying factors of artesian flow, and typical artesian systems.

*479. The geochemical interpretation of water analyses, by Chase Palmer. 1911. 31 pp. 5c.

Discusses the expression of chemical analyses, the chemical character of water and the properties of natural waters; gives a classification of waters based on property values and reacting values, and discusses the character of the waters of certain rivers as interpreted directly from the results of analyses; discusses also the relation of water properties to geologic formations, silica in river water, and the character of the water of the Mississippi and the Great Lakes and St. Lawrence River as indicated by chemical analyses.

INDEX BY AREAS AND SUBJECTS.

[A=Annual Reports; M=Monograph; B=Bulletin; P=Professional Paper; W=Water-Supply Paper, G F=Geologic folio.]

[1] Many of the reports contain brief subject bibliographies. See abstracts.

[2] Many analyses of river, spring, and well waters are scattered through publications, as noted in abstracts.

INDEX OF STREAMS.

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